



Scanning - Shortwave - Ham Radio - Equipment
Internet Streaming - Computers - Antique Radio

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Monitoring Times

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March 2009

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Monitoring the Air Show Experience

*Frequencies, Equipment,
Schedules*



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03

Also in this issue:

- International Radio Serbia
- Monitoring California's Central Valley
- Will the sunspots EVER return?

AOR introduces the **AR-Mini**

Big Features! Small Size!

***This pocket-size
communications
receiver delivers BIG
performance!***

The AR-Mini offers legendary AOR quality and a wide array of the most popular features found in the AR-8200 Mark III. But, the new AR-Mini does it all in a convenient pocket size water resistant version that's very easy on a budget.

Whether you use it for work or pleasure, you can take the AR-Mini with you to listen to public safety communications, airline traffic, marine communications, weather channels, trackside communications at car and motorcycle races, radio and television reporters in the field, shortwave communications from around the world, amateur radio frequencies, AM and FM radio signals, analog TV audio and more.

Powered by two AA Ni-MH cells (1.2v), the AR-Mini operates for approximately 22 hours on a single battery charge but it can also be used with AA alkaline batteries or with an optional DC cigar-lighter adapter.



Actual size

AR-Mini Features include:

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- Weighs only 7.4 oz with antenna and batteries
- Signal meter
- Low battery indicator
- SMA antenna connector

***The AR-Mini is now available
at your favorite AOR dealer!***



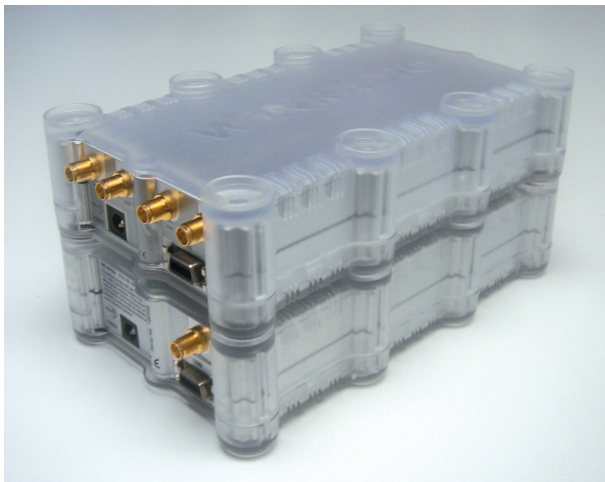
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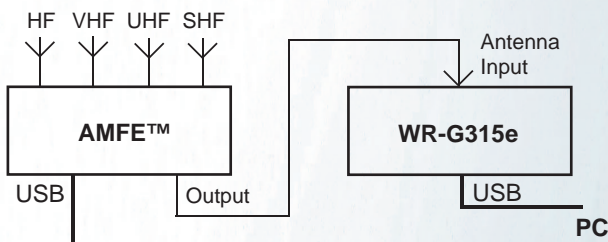
Extend your receiver's range beyond 8 GHz!



WiNRADiO WR-G315e receiver enhanced with WR-AMFE-3500



The WR-AMFE™ adds additional antenna inputs - and more.



Our latest WiNRADiO accessory redefines the definition of "DC to daylight", yet again. And while it is perfect for the WiNRADiO WR-G315 series of receivers, it can be used to extend the frequency range of almost any VHF/UHF receiver.

The frequency range of the WR-G315 receiver can now be extended up to 8.599 GHz using the "AMFE" option (Antenna Multiplexer and Frequency Extender). This is the first time a receiver of such affordable price range can go that high in frequency.

And you also get an antenna multiplexer thrown in, making it possible to connect four antennas for different frequency bands directly to your receiver: No more hassles with antenna switching!

- Input frequency range up to 8599 MHz
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- Suitable for any third-party receivers (AMFE-8600 only)
- Low-noise linear power supply included
- Application software included
- Programmers' API included to support third-party development

The AMFE™ unit interfaces neatly with the WiNRADiO WR-G315e or WR-G315i receiver. The receiver's application software is able to recognize the AMFE™ unit and expand the ranges of the frequency input and display automatically. Switching between the antennas and tuning the local oscillator for the downconversion is accomplished automatically and fully transparently to the user. The AMFE™ enclosure is similar to that of the WR-G315e receiver and stacks neatly on top or under it.

Two models are available: WR-AMFE-3500 (DC to 3500 MHz) and WR-AMFE-8600 (DC to 8599 MHz). The AMFE™ units are USB controlled, supplied with application software and a linear AC/DC power adapter. The WR-AMFE-8600 model can be also used with third-party receivers, and can be optionally fitted with an OCXO for enhanced stability of 0.01 ppm, to suit the most demanding monitoring and surveillance applications.

Monitoring Times

Vol. 28 No. 3

March 2009



Monitoring the Air Show Experience

By Larry Van Horn

Hard as it is to believe, the 2009 annual Air Show Guide marks the 10th year that this report has appeared in the March issue of *Monitoring Times*. Each year something new is added to make the Guide more comprehensive, in addition to updating any information that may have changed. While compiled by MT's Assistant Editor, we also credit its accuracy to hundreds of reports by air show enthusiasts across the U.S. and around the world.

As always, we also include an updated list of scanners which are able to tune in the military frequencies used by military demonstration teams.

This year, in addition to air show schedules (which you will find in the *Milcom* column), we have added website links for you to use when confirming show times, admission details, and other useful information.

Cover photography of a hovering Harrier jet, Thunderbird diamond formation, and Golden Knight parachutist provided by Kevin Burke.

C O N T E N T S

International Radio Serbia 14

By Eric Bryan

Though not the largest, easiest to hear, or most well-funded of shortwave radio stations, Radio Serbia is nonetheless faithful to its English-speaking audience. Not only does it broadcast English nearly every local evening toward the U.S. over its renovated transmitters, but Serbia has added satellite and internet broadcasts as well. Bryan provides a sample of the programming to be heard by tuning in this union of republics (Serbia and Montenegro) from the former Yugoslavia.

Monitoring California's Central Valley 16

By Bruce Ames

The 350-mile-long San Joaquin Valley is often referred to as "the fruit basket of the world." Almost anything can grow here -- though the area is currently experiencing a serious drought. So, is there much to keep a scanner enthusiast amused in such an agricultural area? You bet! Produce has to make it to market, doesn't it?

Besides commerce, this Central Valley includes some of the most spectacular national parks in the country.

This is Bruce Ames' back yard, so come along as he shares with *MT* readers a comprehensive county-by-county scanning profile of California's heartland.



Kevin Burke

Reviews

This month we review the ARRL book *Basic Antennas: Understanding Practical Antennas and Design* by Joel Hallas. We also get a glimpse into AOR's AR-STV wireless camera detector. Afraid someone may be spying on you? Check it out on page 68.

Our *Computers & Radio* columnist also checks out a low-cost computer designed for radio hobbyists. Hudsonville Computers really went "back to basics" for this one: it's powered by atoms! Turn to page 72 if you don't believe me.



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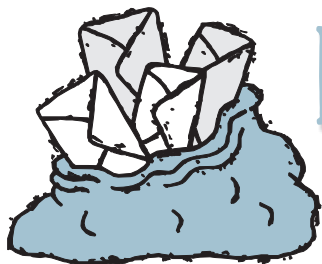
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LETTERS TO THE EDITOR

This column is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be edited or shortened for clarity and length. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902 or email editor@monitoringtimes.com

*Happy monitoring!
Rachel Baughn, Editor*

ODXA Discontinues Publication

Harold Sellers, editor of the Ontario DX Association's publication *Listening In*, recently issued the following statement: "As of June 2009 *Listening In* will cease publication as a magazine. Current columns will be posted to the ODXA website, where they can be viewed or downloaded free of charge. The article-type columns will continue to be edited by me and formatted as they are now. Loggings-based columns will switch to on-line postings..."

Membership/subscription fees are being dropped as of June 2009, and the club is selling off inventory in their book store. Sellers says there will be little need for club funds, except to support the website, which is maintained by Fred Waterer, *MT's Programming Spotlight* columnist.

So, it sounds like information from ODXA will be freely available to anyone, member or not, via www.odxa.on.ca. We wish ODXA all the best and salute them for their bold new move. Be sure to check out their new website as they make the transition to a completely web-based organization. Accommodation for those who can't make the shift will be by individual arrangement.

Resource for Online Hobbyists

"Have you ever heard of Radio Explorer? Here's the web site ... www.radioexplorer.com.ru/en/

"Neat program for SWL's. It's written in Java, so it will be a CPU pig at times. Requires the program download, then some of the files listed under "Input Data." Don't un-zip the zipped files as the program will read the zipped files as it installs.

"Radio Explorer is very much like having the *Passport's* Blue Pages in a program running on the computer (with your WinRA-DiO)."

John Bishop

9 Lives for Pirate Cat?

"Regarding the *Outer Limits* column in *Monitoring Times* for December, I can advise that Pirate Cat Radio is still standing tall on 87.9MHz in San Francisco. Not only that, but their live studio is in a cafe complete with the Pirate Cat logo on the window. See:

<http://piratecatradio.tribe.net/photos/edd2ab34-1ffd-4686-94b6-502cb76c17be> and <http://baylist.sfgate.com/pirate-cat-radio-cafe/biz/102273>

"This must surely be one of the highest profile, most public, longest lasting pirate stations going.

"Pirate Cat radio has been the recipient of several FCC warning letters including: http://fjallfoss.fcc.gov/edocs_public/attachmatch/DOC-264276A1.doc

yet they continue to soldier on. They are more than the usual pirate operation and have in fact become part of the community with live political programming in addition to music shows.

"As we all know, the wheels of the FCC grind slow but exceeding fine, so eventually I expect they will be shut down just as earlier long standing Bay Area pirate stations San Francisco Liberation Radio and Free Radio Berkeley were.

"After Steven Dunnifer of FRB bowed to a court injunction and went off the air, it was reincarnated for a while as Tree Radio Berkeley, reverting to its roots (heh) by broadcasting from the trees of the Berkeley Hills. I was actually listening when FCC agents shut that operation down. The agents said nothing on the air but the operators said, 'Uh... there are some guys in suits here now. They are FCC agents. I guess we'll stop broadcasting now...' Zzzzt.

"If you follow FCC enforcement actions, you know that the FCC, which once did little more than shut the pirate station down, sometimes not even taking the equipment, has become much more harsh on pirate operators. They have been imposing fines of \$10,000 or more on pirate operators. While I quite like Pirate Cat's use of Title 47 Section 73.3542 as a justification for their broadcasts, I doubt that this will protect them from eventual shut down.

"Here in Marin County, just north of the Golden Gate, pirate stations are thin upon the ground, especially here in West Marin where the terrain makes FM propagation difficult. Fifteen years or so ago there was a pirate station in Bolinas, that insular little community that cuts down the highway sign so tourists can't find it, but that's long gone. These days KWMR serves the West Marin communities and even has a translator in Bolinas not far from the site of the original pirate station.

"I myself am not against pirate operations (as long as they don't interfere with the KWMR signal of course!) but always advise community groups considering the establishment of a station to go the legal route.

That's because any successful community radio station attracts people who put their souls into the operation. A pirate station will eventually be shut down and the longer it has been on the air the more painful that shut down will be. Better to spend the time and money to establish a station that will serve the community for decades to come without fear of an FCC raid."

*Richard Dillman - Transmitter Wrangler
KWMR - West Marin Community Radio
Pt. Reyes Station, California*

Preserving the Memory of RNI Sarah

"I thought your pirate radio readers might remember Pirate Radio *RNI-Sarah*. I made this model depicting the 1988 event when the Coast Guard put *RNI-Sarah* out of business. On deck can be seen Al Wiener, Ivan [Rothstein], and the reporter from *Village Voice* news."

Joseph Giudonis, Philadelphia, PA

If you *don't* remember the story of Radio NewYork International, WBCQ owner Alan Weiner's most notorious effort at broadcasting without an FCC license, a good place to start reading is http://en.wikipedia.org/wiki/Radio_NewYork_International; you can even see some live footage at http://rfny.hankhayes.com/05_rni.html





Air Show Specials!

Handheld Unit	Stock No	Price
Alinco DJ-X7	SCN03	\$179.95
Alinco DJ-X2000T	SCN10	\$539.95
AOR AR-8200 Mk III	SCN51	\$599.95
GRE PSR-500	SCN18	\$499.95
Icom IC R-20	SCN20	\$539.95
Icom IC R-5 Sport	SCN12	\$174.95
Uniden BCD-396T	SCN47	\$499.95

Base/Mobile Unit	Stock No.	Price
AOR AR-5000A+3B	RCV44P	\$2569.95
AOR AR-8600 Mk IIB	RCV11	\$899.95
GRE PSR-600	SCN19	\$499.95
Uniden BCT-15	SCN15	\$229.95
Uniden BCD996T	SCN48	\$499.95

Computer Receivers	Stock No.	Price
Icom PCR-1500	RCV15	\$499.95
Icom IC-R1500	RCV25	\$599.95
Icom PCR-2500	RCV35	\$729.95
Icom IC-R2500	RCV52	\$899.95
WinRadio WR-G305e	RCV63	\$619.95
WinRadio WR-G305i	RCV53	\$519.95
WinRadio WR-G305e/PD	RCV63P	\$719.95
WinRadio WR-G305i/PD	RCV53P	\$619.95
WinRadio WR-G315e	RCV64	Call for pricing
WinRadio WR-G315i	RCV54	Call for pricing
WinRadio WR-3500e	RCV49-E	\$1995.95
WinRadio WR-3500i-DSP	RCV49-I	\$2195.95
WinRadio WR-3700e	RCV50-E	\$2895.95
WinRadio WR-3700i-DSP	RCV50-I	\$2895.95

Professional Receiver

AOR AR-Alpha Not available in a consumer version.
AOR AR-One Not available in a consumer version

Shipping/ Handling Charges

Total Order	Shipping Charges
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\$30-\$49.99	\$6.95
\$50-\$99.99	\$8.95
\$100-\$399.99	\$12.95
\$400-\$899.99	\$16.95
\$900-\$1499.99	\$20.95
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Create CLP51302N Log-Periodic An.	ANT 17	\$299.95
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MISCELLANEOUS ACCESSORIES

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Scantcat Gold for Windows	SFT 2W	\$99.95
Scantcat Gold for Windows SE Upgrade	SFT 2SE	\$59.95
Scantcat-Lite Plus	SFT 19	\$29.95
PAR VHF Intermod Filter 152MHz	FTR 152DS	\$69.95
PAR VHF Intermod Filter 158MHz	FTR 158DS	\$69.95
PAR VHF Intermod Filter 462MHz	FTR 462DS	\$69.95
FM Trap Filter 88-108MHz	FTR-FMDS	\$69.95
PAR NOAA Weather Filter 162 MHz	FTR 162DS	\$69.95
Yaesu SP-8 Speaker	SPK 4	\$159.95
GRE Superamplifier	PRE 1	\$59.95
VS6 Mobile Speaker	SPK 7	\$12.95



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COMMUNICATIONS

by Ken Reitz

"Communications" is compiled by Ken Reitz KS4ZR (kenreitz@monitoringtimes.com) from news clippings and links supplied by our readers. Many thanks to this month's fine reporters: Anonymous, David R Alpert, Rachel Baughn, Wayne Heinen, Maury Midlo, Craig Scott, Gayle and Larry Van Horn, Ed Yearly, and George Zeller.)

SHORTWAVE/AMATEUR RADIO

BBC and DW Launch MW DRM Channel for EU

A joint press release in December from BBC and Deutsche Welle announced the launch of a new radio channel for Europe using Digital Radio Mondiale (DRM) broadcast technology. The 18 hour/day medium wave service (1296 kHz) will air the top programs from the two venerable European services in English using six transmitters in pairs that will let the DRM signal cover most of Western Europe with "near FM quality."

The Incredible Shrinking Ionosphere

A report in the December 17 *Space Daily* (www.spacedaily.com) notes that NASA instruments aboard an Air Force satellite launched in April, 2008 show that "...the boundary between Earth's upper atmosphere and space has moved to extraordinarily low altitudes." The report said onboard sensors found the ionosphere to be at 260 miles (nighttime) and 500 miles (daytime) compared with more typical values of 400 miles (nighttime) and 600 miles (daytime).

2008 Sunspot Flop

As if a shrinking Ionosphere wasn't enough, *MT* contributor Tad Cook K7RA reported, in a propagation bulletin issued January 2 by ARRL HQ, what everyone who turned on a shortwave radio last year had already suspected: 2008 was a total flop for shortwave listening and amateur radio communications.

Cook noted that the average daily sunspot number for the year was 4.7. How big a flop was that? By comparison 2007's daily average was a whopping 12.8. He noted, "The yearly average of daily sunspot numbers for 1999 through 2008 were: 136.3, 173, 170.3, 176.6, 109.2, 68.6, 48.9, 26.1, 12.8 and 4.7" Please tell us that 2008 was the bottom!

One Ham's Antenna Victory

An article in the *Pittsburgh Tribune-Review* detailed the victory of an area ham to keep his 53-ft radio tower in his backyard after a battle with neighbors was ended by the local township's zoning hearing board. The board, aided by the ham's alert attorney, came to its senses when it was pointed out that FCC rules trumped local and state law regarding what can and can't be on one's property.

Using words taken directly from FCC rules, the board said in its ruling that "State and local regulation of a station antenna structure must not preclude amateur service communications. Rather, it must reasonably accommodate such communications and must constitute the

minimum practicable regulation to accomplish the state or local authority's legitimate purpose." The vote by the board on the neighbor's appeal was 5-0 in favor of the ham.

PUBLIC SERVICE

Boston Police Radio

An article in the *Boston Herald* reported that an explosion in a manhole caused a power surge that knocked out the computer that controlled the police and EMT radios. The story explained that computer screens in squad cars went blank and police as well as EMT workers had to use private cell phones as back-up communications. Ordinarily, a backup power supply would have kicked in but, according to the article, it had been recently taken out of service because leaking batteries had posed a hazardous materials threat at communications headquarters. The article noted that the city's 911 service had shut down three times in the past.

Aging Radio System in Cleveland Down (Again)

An article in the *Cleveland Plain Dealer* detailed the woes of an aging Motorola radio system used to send police 911 calls which also crashed three times last year. Things got so bad that a later article in the *Plain Dealer* actually announced "Cleveland Police Radios Functioning Today." The paper reports that a replacement system will cost the city \$30 million. Meanwhile, it said, technicians will lash together more fixes including reloading software and repairing busted hardware. (*See Scanning Report for more on this story.*)

High-Tech Knuckleheads on Parade

An article in the *Mid-Hudson News* (NY) reported that three men stripping tires from a car on the street were apprehended in that town. It turns out that one of the gang had accidentally pressed the 911 auto dial on his cell phone and the suspicious-sounding "work" was exposed. The call was traced and the trio was arrested.

The *Toronto Star* reported that a Toronto man was arrested after he stole a car that was equipped with a GPS locator system at the scene of an accident. Unfortunately for the man, the car was a "low-profile traffic stealth" car used by Toronto police in traffic enforcement. The car was recovered and the thief arrested in minutes.

A report on Fort Myers (Florida) NBC2 News detailed the theft of a 26 foot radio tower from a man's home over a weekend. He told investigators that he had only left the house for half an hour that weekend and that the thieves would have to have climbed on the roof to disassemble the tower.

An article in the *Soweten* (Cape Town, South Africa) reported that two men were arrested after they had climbed a cell tower more than 150-ft tall in order to pray closer to Jesus. The men had gained access to the tower despite high security measures at the tower's base. According to the article, the men, who carried Bibles and other religious books, told officers that God had opened the gates for them and they walked through. A court declined to charge the pair.

BROADCASTING

Disgruntled WRIU-FM Listeners

When WRIU-FM, a non-commercial educational station licensed to the University of Rhode Island, changed its format in 2003 to limit jazz and classical music fare and expand its programming to include other musical styles, some listeners were upset. In 2006 two such disgruntled listeners decided to attempt to deny a petition for renewal of the station's license when it came up for renewal at that time. In January of this year the FCC denied the request and in their denial offered a study for others to learn the proper procedure for such a battle.

According to FCC documents regarding the case, the two "...styled their pleadings as a 'Petitions to Deny.'" But, the FCC treated the pleadings as Informal Objections because they failed to comply with the procedural requirements for filing Petitions to Deny.

One charge made against the station was that it failed to include in its Public File, documents relating to public comment the station solicited from the public at the time that it announced its intentions to limit jazz and classical music. The FCC explained that its rules do not require a station to keep copies of letters or e-mail messages from the public.

Finally, if you plan to deny a station's petition to renew, realize that the FCC moves really, really slow and read this FCC publication: www.fcc.gov/localism/renew_process_handout.pdf Meanwhile, you may want to find another source of music.

DTV Shambles

As this is written, there are still more than 30 days before the much anticipated switch to digital off-air TV. But, things are not looking good. The congressionally funded, \$1.34 billion DTV coupon program ran out of money as of January 4. The National Telecommunications Information Agency (NTIA), which oversees the program, reported that by January 4, 24 million households had requested 46 million coupons and that 52 percent had been redeemed and 13 million expired. Four days after the NTIA-run

program ran out of money there were hundreds of thousands of households on a waiting list to receive the unavailable coupons.

Meanwhile, the consumer advocate group Consumer's Union is asking Congress to extend the analog TV cut-off date because so many have not gotten their DTV converters. It notes that the government was pocketing \$19 billion from the sale of the analog TV space and forcing the remaining viewers, who had not bought a converter, to have to pay for them on their own. It further noted that many in that group included the elderly and other low income groups.

Additionally, Consumer's Union claimed the FCC was totally unprepared for the onslaught of calls it will have to field nationwide to help bewildered viewers. The FCC seems to agree, as it has even asked the amateur radio community to help field technical questions in their respective communities.

In the insult-to-injury department, and as a possible omen of how things would eventually work out, there was this headline in the November 10 *Wall Street Journal* on-line: "FCC's NASCAR Car Crashes Again." According to the piece, the Commission forked over \$355,000 to sponsor the number 38 Digital TV Transition Ford, driven by David Gilliland, for the last three races of the 2008 season in order to help get the DTV message out. The report noted that the car crashed out in its first two races but, according to NASCAR.com, the team pulled it together for the last race of the season finishing 27th out of 46 cars entered after starting in 34th place.

SATELLITES



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The Unemployment Channel

A Chicago-based company hopes to take advantage of the economic fiasco by offering a platform for people to advance their cause toward re-employment. The company launched a Free-to-Air digital TV signal via C-band satellite (AMC-3 87°W on transponder 23) in addition to their web site: www.unemploymentchannel.com. People seeking work pay to have their self-produced infomercials aired on the channel and hope somebody who might hire them is watching.

CONSUMER ELECTRONICS

Down-sized CES Still Dreaming Big

A report in the *Financial Times* from January 7 noted the recessionary toll on the annual



Consumer Electronics Show (CES) hosted by the Consumer Electronics Association (CEA) and held each year during the second week in January. For the first time in 10 years, the CEA reported that everything is slightly down-sized: number of exhibitors, staff at the exhibits, and attendees. Still, those companies attending are eager to flog their new wares.

Just when you're starting to get used to your new digital TV set, the manufacturers are blazing full speed ahead with yet a newer generation of TV sets. A report in the *Washington Post* noted that new sets demonstrated at CES employed built-in Internet applications.



Just when you got used to your new wide-screen HDTV set, new ones are coming on line with Internet applications and 3D images. (Courtesy: Sony)

For example, a Samsung set uses embedded Yahoo! Widget Engine software that allows access to YouTube and Flickr fare via what it calls "Internet@TV - Content Service." A new Panasonic set also gives you access to YouTube videos and Picasa photo galleries as well as 3-D TV. The report said that Sony will also be using Yahoo software in its new sets. Electrons and PR departments never sleep.

Toys 'R' Us Two-way Radio Recall

The Consumer Products Safety Commission announced a recall of some 8,000 two-way Cobra FRS radios sold exclusively through Toys 'R' Us stores and manufactured by Cobra Electronics (pictured below) between August and September of 2008. The cause of the recall is said to be leaking batteries which can cause a chemical burn if it comes into contact with the skin.

The company advises consumers, if the batteries have been leaked on to the radio, not to touch the liquid. Consumers are urged to immediately stop using the two-way radios and contact Cobra for a free replacement and a 20%-off coupon for a future purchase at their web site. Owners are urged to contact Cobra Electronics at 888-252-9889 between 8 a.m. and 6 p.m. ET Monday-Friday or visit the firm's web site at www.cobra.com for more information.



Cobra Toys 'R' Us Two-way Radio Recall (Courtesy: Consumer Product Safety Commission)

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Monitoring the Air Show Experience

The Annual MT Air Show Guide

By Larry Van Horn, MT Assistant Editor, N5FPW

If that bit of chatter above sounds familiar to you, then chances are you have monitored communications at a military air show sometime in the past. And when you canvass military radio hobbyists from around the world, one of their favorite monitoring activities, hands down, is monitoring air show communications.

Nothing stirs up the aircraft enthusiast's juices more than these two magical words – *Air Show!*

Every year, from March through November, thousands hit the road to watch the action, as military and civilian aero teams put their aircraft through the paces to entertain and perform.

While there is nothing quite as thrilling as going out to one of these public air shows and watching the military or civilian demonstration teams strut their stuff in front of thousands of aircraft fanatics, you can add to the visual experience by monitoring the performing teams' radio communications. With a radio scanner in hand, you will experience a whole new perspective of the show that few attendees will realize or enjoy.

Since the new 2009 air show season starts in the second week of March, we here present our annual *MT Milcom Air Show Guide*, giving you the frequencies to monitor, the recommended list of air show radio equipment, and the major military flight demonstration team schedules for the upcoming air show season.

On a personal note, it is really hard for me to believe that you are reading the 10th annual *Monitoring Times Milcom Air Show Guide* here in the pages of *MT*. What started out as an answer to a question by a reader of the *Milcom* column ten years ago, has grown into one of the most eagerly anticipated features in this magazine each year -- and for good reason.

Where do you hear the action?

From time to time, frequencies for air show teams do change, so it's important to know where to search for potential new frequencies. When the U.S. Navy Blue Angel flight demonstration team made some major changes back in 2004, seasoned veterans knew the right bands to target to look for the new frequencies being used.

Last year, we saw major changes in the VHF frequencies used by the famed U.S. Air Force Thunderbirds. Again, thanks to veteran monitors who knew where to monitor, we were the first to report on our *Milcom Monitoring Post* blog the major frequency changes used by the boys in Blue in 2008.

Just like the veterans, if you concentrate on the bands listed below, you should be able to locate most air show activity at the show you are attending (all frequencies in this article are in MHz unless otherwise indicated).

118.000-137.000	25 kHz search steps (AM mode) Note: We have reports of a lot of new air show activity in the new portion of the civilian aero band – 136-137 MHz. Be sure to check out this frequency range out for civilian and military demo aircraft communications
122.700-123.575	25 kHz search steps (AM)
138.000-144.000	12.5 kHz search steps (AM/Narrowband FM)
148.000-150.800	12.5 kHz search steps (AM/NBFM)
225.000-380.000	25 kHz search steps (AM)
406.100-420.000	12.5 kHz search steps (NBFM)

U.S. Navy Blue Angels

The U.S. Navy (USN)/Marine Corps (USMC) military team is represented on the air show circuit by the Blue Angels flying their F/A-18 Hornet aircraft.

A Blue Angels flight demonstration exhibits the skills possessed by all naval aviators. It includes the graceful aerobatic maneuvers of the four plane Diamond Formation, in concert with the fast paced, high performance maneuvers of its two Solo Pilots. At the close of every show, the team illustrates the pinnacle of precision flying, performing maneuvers locked as a unit in the renowned, six jet Delta Formation.

The team is home based at Forrest Sherman Field, Naval Air Station Pensacola, Florida. However, the squadron does spend January through March each year training pilots and new team members at the Naval Air Facility in El Centro, California.

The Blue Angels are scheduled to fly 67 air shows at 34 air show sites in the United States and Canada during the 2009 season, as the team celebrates 23 years of flying the F/A 18 Hornet. Since its inception in 1946, the Blue Angels have performed for more than 450 million fans.

The other major piece of hardware in the squadron is their C-130 Hercules transport aircraft, affectionately known as “Fat Albert.” It is the only Marine Corps aircraft permanently assigned to support a Navy squadron and is flown by an all Marine Corps crew of three pilots and five enlisted personnel. “Fat Albert” flies more than 140,000 miles during the course of a show season.

After coping with a multitude of frequency changes during the 2004 season, the 2008 season was relatively stable and quiet for the Blue Angels. The primary AM mode UHF frequencies monitored during last season include:

Blue Angel Frequencies

Frequency Usage

-----	Pensacola (KNPA) frequencies <Channels 1-7>
-----	Show Site frequencies <Channels 11-15>
237.800	Solos <Channel 8>
250.975	Diamond (new in 2008)
255.200	Circle and arrivals discrete <Channel 17>
275.350	Diamond <Channel 9>
284.250	Show Box/Delta <Channel 16>
289.800	Aerial Refueling
289.900	Aerial Refueling
305.500	Fat Albert “Bert” Primary/Solos (West Coast) <Channel 10>
346.500	“Checklist Freq” – Pre-show checklist, ground star/, roll out, and maintenance <Channel 18>

During the 2005 show season, the Blues started using a new ground cart for show communications. Two new narrowband FM splinter frequencies/designators were found in use: 139.8125 <Bravo/Channel 3> and 142.6125 <Alpha/Channel 3A>. In 2007, another possible new NBFM frequency was reported: 141.5625



Brian Topolski

MHz <Charlie>.

Although we believe that the older 162-174 MHz Blue Angel FM LMR frequencies are no longer being used, I have not deleted them from this list, as some West Coast monitors claim that some of them were still being used as late as 2007.

I encourage those of you with Signal Stalker® and Close Call® capability to watch the LMR spectrum from 138-144 MHz closely for new additional 12.5-kHz splinter frequencies being used by the team's ground crews.

Additional Blue Angel Frequencies

Cross Country Air-Air

138.250 143.600 237.800 238.150
275.350 284.250 303.000 (AM)

Maintenance/Ground communications [Old communications comcart/ground frequencies] (NBFM)

140.100 142.000 143.600 163.000
164.900 165.225 167.500 167.800
168.900 169.400 170.900

Tower-Comm Cart (May no longer be used)

173.825 (NBFM)

Tower Observer 143.000 (AM)

UHF frequencies not reported in recent seasons

236.450 249.625 251.600 254.500
256.250 262.850 263.350 264.350
264.550 265.000 273.300 286.000
299.650 302.100 (Fat Albert Secondary)
302.150 307.700 381.000 (AM)

U.S. Air Force Thunderbirds

The premier U.S. Air Force (USAF) flight demonstration team is known as the Thunderbirds. The big changes to this year's guide include a host of new frequencies used by the team during the 2008 air show season.

2009 marks the 56th season that the T-Birds have performed air shows and this year they will conduct more than 73 shows in the United States, Puerto Rico and the Far East.

The Thunderbirds recently completed a swap of their older F-16 Block 32 Fighting Falcon aircraft for more advanced and powerful F-16 Block 52 airplanes that will debut this season. They will perform formation flying and solo routines. The four aircraft diamond formation demonstrates the training and precision of Air Force pilots, while the solos highlight the maximum capabilities of the F-16. The pilots perform approximately 30 maneuvers in a demonstration. The entire show, including ground and air, runs about an hour and 15 minutes.

As mentioned above, the Thunderbirds used eight new VHF/UHF frequencies that have been included in our list below.

USAF Thunderbird Frequencies

Frequency Usage

139.8000* Thunderbirds <Victor 1> (AM)
paired w/148.850

139.2250* Thunderbirds <Victor 1> (AM) West
Coast

140.4000 Support "T-Bird Ops"/Cross country
air-to-air

140.7000* Reported at Canadian air show
and cross country in northern U.S.
<Victor 1>

141.8250 Alternate Diamond <Victor 2>

143.2500* Pre-Engine Start

143.7000* Diamond and Delta formations
<Victor 1> (AM) paired w/150.150

148.1250* Thunderbirds <Victor 1> (AM)

Georgia near end of the season

148.8500* Alternate Diamond <Victor 2>
paired w/139.800

150.1500* Alternate Diamond <Victor 2>
paired w/143.700

225.1750* Thunderbirds <Uniform 1> (AM)

Georgia near end of the season

235.2000 Thunderbird Control/ComCart/
Cross Country (AM)

235.2500 Pre-Engine Start and Solo aircraft
on/off show center/ linked to PA
system (AM) <Uniform 1>

322.9500 Engine Starts/Solo aircraft (5-6)
Air-Air (AM) <Uniform 2>

*indicates a new frequency used in 2008

Maintenance/Ground teams (NBFM)

216.725 Announce PA feed - Music and show
narration <Channel 55>

216.975 Team air show frequency feeds/
mix - air-to-air simulcast <Channel
60>

413.275 Ground Maintenance Analog (DCS
431)

413.325 Ground Maintenance Analog (DCS
503)

There are other 216 MHz frequencies that are transmitted from the T-Bird Comm cart using Comtek gear which are interesting to monitor. You can get a complete Comtek bandplan link for that frequency range in our internet resource guide printed in this month's *Milcom* column. If you don't hear the cart on the frequencies that I have identified above, do a search using the frequency chart listed in the Comtek link.

Previously used frequencies used by the team are listed below. If you hear any of these frequencies in 2009, please let us know at the email address in the masthead.

Aero

141.8500 (Pre-take/Four ship/Diamond
formation linked to PA system/Cross country
air-to-air <Victor 2>); 143.8500 (Diamond
formation/Cross country air-to-air <Victor 1>);
and 235.0250 (Unknown usage)

VHF

142.175 and 143.900 (appear to have been
replaced by the 413 MHz frequencies noted
in our list above); 142.5750 (Program audio/
Air-Ground communications)

UHF

216.775 (Announce PA feed - show narration
<Channel 56>); 413.000 (P25); 413.025
(Analog channel 1); 413.100 (Analog chan-



Brian Topolski

nel 2); 413.250 (Analog); 413.350 (P25);
413.375 (P25); 901.500 (Comm Cart Head-
set); 905.350 (Comm Cart Headset)

Other US DoD Military Flight Demo Teams

In addition to the two units mentioned above, the Navy and the Air Force also have other flight demonstration units. Other branches of the Department of Defense (DoD) and David Shultz air shows (one of the premier air show companies) use a wide variety of VHF and UHF frequencies during air shows.

VHF frequencies to watch for air show activity include:

138.150	138.200	138.250	138.500
138.550	138.575	138.600	138.625
138.675	138.750	138.825	138.950
139.000	139.225	139.300	139.525
139.600	139.700	139.900	140.200
140.300	140.500	141.150	141.250
141.300	141.400	141.550	141.600
141.650	141.950	142.300	142.600
142.700	142.800	142.900	143.000
143.150	143.200	143.250	143.550
143.600	143.625	143.700	143.750
143.825	148.125	148.150	149.000
150.150	150.250	150.300	MHz

UHF frequencies to watch for air show activity include:

225.175	226.425	227.675	228.575
229.175	230.150	235.125	238.350
238.575	245.250	252.125	255.150
259.375	265.950	266.250	271.750
273.375	281.850	294.525	298.350
308.075	316.225	326.900	328.075
335.750	341.650	348.500	356.950
364.050	371.800	372.075	379.375 MHz

Some of the frequencies recently reported for these organizations are listed below. (AM mode is used for all the frequencies listed below unless otherwise indicated.)



David Gifford

US MILITARY FLIGHT DEMO TEAMS

Air Force ACC A-10 Thunderbolt demonstration teams

East Coast – 23 Wing based at Moody AFB, GA will pick up the demo duties in 2009

West Coast – 355 Wing based at Davis Monthan AFB, AZ

122.475 123.150 123.475 136.575 138.050 138.100 138.200
138.250 138.300 138.475 138.500 139.900 139.625 136.675
139.725 139.800 139.975 140.400 141.675 142.200 225.500
236.850 251.200 269.900 283.700 305.400 327.700 341.500
343.000 343.000 376.025 384.550

Air Force ACC F-15E Strike Eagle

East Coast – Demonstration team based 4th FW Seymour-Johnson AFB, NC

West Coast – The 366th Wing at Mountain Home AFB in Idaho will stand up another Strike Eagle Demo Team in 2009. Watch the following frequencies for activity:

123.150 298.300 376.025 384.550

Air Force ACC F-16CJ Viper demonstration teams

East Coast – Shaw AFB, SC

West Coast – Hill AFB, UT

136.575 136.675 365.700 376.025 283.700 376.025 384.550

Air Force ACC F-22A Raptor flight demonstration team

1st FW Langley AFB, VA

238.900 290.225 292.700 376.025 387.200

Air Force ACC Heritage Flight

118.500 (Air/Air) 122.475 123.150 123.425 123.450 127.150
136.575 136.675 238.150 282.800 376.025 384.550

Air Force AETC T-6 Texan East Coast Team (disbanded in 2006)

Air Force B-1B Bomber Flyover 238.150

Air Force B-2 Bomber Flyover/Static displays – 509BW Whiteman AFB, MO
290.225 335.550 370.900 388.850

Air Force B-52 Bomber Flyovers 376.025

Air Force Combat search and rescue (SAR) demonstrations

127.150 138.100 139.700 225.450 236.000 242.000 251.900
252.800 259.000 278.800 280.500 282.800 287.500 381.000
384.550

Air Force F-15C Eagle flight demonstration team – Eglin AFB, FL

Air Force F-117 Stealth flight demonstration team (aircraft longer in service)

Army Aviation Heritage Foundation 123.450 234.500 242.400

Army Blackhawk Demo 30.40 (PL 151.4 Hz) 46.850 242.400
(Primary) (NBFM)

Coast Guard aircraft/SAR demonstrations

122.900 (SAR)

157.050 (Drug Interdiction demo - NBFM)

157.075 (Command Post -NBFM)

237.900 282.800 326.150 345.000 (Demo) 379.050

Coast Guard HITRON interdiction demo 157.050 (NBFM)

David Shultz Air Shows (Civilian company)

118.700 (Ground Ops)

132.950 (Operations)

135.650 (Airboss)

238.150 (Airboss)

350.300

Maine Corps AV-8B II flight demonstration teams (frequency information is needed for these units)

East Coast – MCAS Cherry Point, NC

West Coast – MCAS Yuma, AZ

Navy F/A-18C Hornet flight demonstration teams (frequency information is needed for these units)

East Coast – NAS Oceana, VA

West Coast – NAS Lemoore, CA

Navy F/A-18F Super Hornet flight demonstration teams (frequency information is needed for these units)

East Coast – NAS Oceana, CA

West Coast – NAS Lemoore, CA

Navy LCAC comms 40.400 (NBFM)

Navy Light Amphibious Vehicle comms 30.000 (NBFM)

Navy S-3 Viking aircraft demonstrations (aircraft longer in service)

Navy SAR demonstrations

242.500 282.000 283.100

DoD Military Parachute Demonstration Teams

The premier DoD military parachute team on the air show circuit is the **U.S. Army Golden Knights** based out of Fort Bragg, North Carolina. The team aircraft used during air shows is either the C-31A Friendship or UV-18A Twin Otter.

Look for their communications on the often reported frequencies of 122.775, 123.400, 123.475, and 123.500 MHz. You should also keep the following plugged into your scanner for possible GK team activity: 32.300 32.400 122.575 124.875 126.200 238.000 284.900 and 367.700 MHz. Also watch for a possible new VHF frequency of 142.800 MHz for Golden Knight radio activity in the near future.

The U.S. Army actually has more parachute teams than just the Golden Knights. The U.S. Army Special Operations Command parachute team is known as the **Black Daggers** (see *MT Milcom* May 2004). Several frequencies have been uncovered for them during the last four seasons, including: 123.450, 136.000, 136.500, 138.650, 237.300, 238.150 MHz.

Another Army parachute outfit is the **Silver Wings**. This is the Fort Benning, Georgia, Command Exhibition Parachute Team. They have been monitored on 34.650 and 44.900 MHz. However, both these frequencies were common landing zone frequencies in the area they were performing in, so if neither of the two frequencies above is heard at a performance you attend, I suggest you initiate a rigorous search of the VHF-low band frequencies.

In addition to the VHF low band frequencies mentioned above, ground and safety personnel associated with this team have been heard using 467.6125 MHz (FRS channel 10/GMRS) for communications. There was also one report that the team was using an Intra Squad radio frequency of 397.500 MHz. See our comments below about programming ISR, GMRS and FRS channels for air show monitoring.

The U.S. Army has several more teams, but we still do not have frequency information for them. We would appreciate communication reports on the following U.S. Army teams if you catch them performing this air show season:

All American Free Fall Team (82nd Airborne) – Fort Bragg, North Carolina

Green Beret Parachute Team – Fort Bragg, North Carolina

Black Knights – US Military Academy, West Point, New York

The U.S. Special Operations Command has a team based out of MacDill AFB in Florida. They have been heard on the following frequencies: 122.450 123.450 and (no, this is not a misprint) 151.625 MHz, a nationwide business itinerant frequency.

During the 2007 show season, the U.S. Air Force Academy Parachute Team **Wings of Blue** was reported. Two frequencies were reported: air-to-ground jump coordination frequency on 121.950 MHz (AM) and 407.500 MHz (NBFM).

We have now also confirmed the frequency for the **Screaming Eagles** (101st Airborne Division) Parachute Team, based out of Fort Campbell, Kentucky – 44.200 MHz (NBFM).

And last, but not least, the colorful U.S. Navy Seal Parachute Team, known as the **Leap Frogs**, are frequent visitors around the country at various sporting events and air shows. This team has been regularly reported on 270.000 (AM) and 407.500 MHz (NBFM 131.8-Hz PL tone) nationwide over the last several years.



Brian Topolski



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GMRS Frequencies

During the 2001 and 2002 seasons, I received several reports that the Golden Knights were using GMRS (General Mobile Radio Service) frequencies 462.625, 467.5625, and 467.6125 MHz. In addition to hearing air show demo crews, monitors have found vendors and other military ground units using GMRS frequencies. You should make these frequencies part of your scanner load-out prior to the air show.

A	B	C
462.550	467.550	462.5625
462.575	467.575	462.5875
462.600	467.600	462.6125
462.625	467.625	462.6375
462.650	467.650	462.6625
462.675	467.675	462.6875
462.700	467.700	462.7125
462.725	467.725	

*(462.675/467.675 National Emergency Frequency pair)

Legend:

- A. Base station, Mobile relay, Fixed station, or Mobile station
- B. Mobile station, Control station, Fixed station operating in Duplex mode.
- C. Interstitial frequencies, base and portable simplex

Family Radio Service/Intra-Squad Radio Frequencies

We have also received several reports of the ground pyrotechnics personnel from the Tora Tora Tora and Warbirds flight demonstration team using FRS (Family Radio service) radios for communications during shows. You will also find military monitoring enthusiasts attending an air show using FRS radios to coordinate meeting fellow monitors. Load up FRS frequencies below (NBFM mode) in your scanner or carry a FRS radio to the show, and you might make a new Milcom monitoring friend or two.

462.5625 Ch 1	467.5625 Ch 8
462.5875 Ch 2	467.5875 Ch 9
462.6125 Ch 3	467.6125 Ch 10
462.6375 Ch 4	467.6375 Ch 11
462.6625 Ch 5	467.6625 Ch 12
462.6875 Ch 6	467.6875 Ch 13
462.7125 Ch 7	467.7125 Ch 14

The government version of the Family Radio Service is known as the Inter-Squad Radio or ISR. As noted above, I have seen several reports over the last few years that these radios might be in use at air shows by military units, including the Civil Air Patrol (CAP), see below. It might be a good idea to program these frequencies in your scanner as part of your air show load out.

396.8750 Ch 1	397.9500 Ch 8
397.1250 Ch 2	398.0500 Ch 9
397.1750 Ch 3	399.4250 Ch 10
397.3750 Ch 4	399.4750 Ch 11
397.4250 Ch 5	399.7250 Ch 12
397.4750 Ch 6	399.9250 Ch 13
397.5500 Ch 7	399.9750 Ch 14

U.S. Civil Air Patrol Frequencies

Finally, you should program U.S. Air Force Civil Air Patrol frequencies in your scanner as well. We have received field reports of CAP frequencies (repeater and simplex) being used as ground support at several air shows.

The CAP was in the process of transiting to narrowband allocations/equipment during 2007. Though transition was to have been complete as of October 1, 2007, some regions have still not made the transition due to frequency conflicts. Therefore we have included both the old assignments as well as the new assignments (all these frequencies were found in the public domain).

CAP Frequencies (variety of modes)

Old assignments:

143.750 143.900 148.125 148.1375 148.150 148.5375
148.975 149.5375 MHz

New assignments:

138.0125 140.6375 142.2250 143.7250 143.9000 148.1750
148.7750 150.1625 150.5625 150.6375 MHz

Civilian/Foreign Air/Parachute Demonstration Teams

The Canadian Forces Snowbird aircraft demonstration team (431 Air Demonstration Squadron) is another regular on the U.S./Canada air show circuit. The following frequencies have been recently reported for this popular aerial team:

123.325 227.600 242.600 243.400 245.500 245.750 246.500
272.100 (Primary) 284.900 299.500 333.300 340.100 MHz

A new Snowbird VHF frequency has now been noted in use during the last three seasons: 116.000 MHz (AM): 243.400 and 272.100 are the only two UHF frequencies reported in 2005-7.

The Canadian Forces also have a CF-18 demonstration team. Brian "Check your Six" Topolski in Connecticut passed along these possible frequencies for that team:

128.9750 129.0250 130.0750 245.5000 263.5000 (Air/Air)
263.7000 264.6000 (East Ops) 274.4500 285.9750 312.5500
(Air/Air) 316.5500 333.3000 335.6000 340.2000 (West Ops)
341.7000

At most air shows, the military flight demonstration units aren't the only performers. Civilian organizations, companies, and individuals sponsor a wide variety of aerobatics teams and parachutists to thrill the crowd. Many different frequencies are used by these teams in the civilian aviation band. Load your scanner with the following frequencies and you shouldn't miss out on communications used by the civilian acts.

122.725 122.750 122.775 122.825 122.850 122.875 122.925
122.950 122.975 123.025 123.050 123.075 123.150 123.175
123.300 123.325 123.350 123.400 123.425 123.450 123.475
123.500 129.650 129.925 136.575 136.975

Some specific frequencies reported to us for other foreign military and US civilian flight demonstration teams are included in the list that follows:



Brian Topolski

Civilian Flight Demonstration Teams

Aeroshell Aerobatics Team	123.150	
Aerostars CJ-6/YAK-52 Flight Formation Team	118.700	122.775
Air Force Reserve Biplane (Ed Hammil)	123.150	
All American Firebirds Flight Demonstration Team	122.775	
123.475		
American Four Jets Patriot	127.300	
Bud Light Air Force (ex- Coors Microjet)	122.925	123.350
123.475		
Chapman/Mancuso Aerobatics	136.975	
Civilian Air Show Discrete Common	123.150	
Dan Buchanan Hang Glider	123.150	128.675
Flight for Diabetes (Michael Hunter)	123.425	
Firecat (Rich Perkins)	123.500	
Flying Colors Hang Glider Aerobatic (Dan Buchanan)	123.300	
123.450 123.950		
Fowler Cary T-33 Aerobatics	123.150	
French Connection Air Show	122.925	122.975
129.975		
Geiko Extra 300 – Tim Webber	123.150	
Greg Koontz Super Decathlon Demo	123.150	
Ian Groom's FedEx Red Bull Aerobatic Team	122.725	122.775
122.825 122.925 123.150 123.350		
Iron Eagles Aerobatic Team	122.925	123.150
123.475		
John Klatt	120.600	123.475
Julie Clark's US of Air	118.700	120.600
L39 Patriots	127.300	
Lima Lima Flight Team	123.150	123.175
123.425 123.575		
Manfred Radius Glider Aerobatics Team	123.150	
North American Jet Air Show Team	122.775	122.925
129.650 129.925		
Northern Lights Aerobatic Team	123.325	136.975
Oreck Vacuum Cleaners Aerobatic Demo (Frank Ryder)	122.825	
123.425 123.450		
Otto the Helicopter	123.150	123.300
Patty Wagstaff Air Shows Inc	122.750	123.475
Pitts Special U.S. Air Force Reserve	123.150	
Rayban Gold Aerobatics Team	122.925	
Red Baron Stearman Squadron	122.725	122.775
123.150		
Red Bull Air Race-Michael Goulian	135.075	
Red Eagles Flight Demo Team	120.600	123.150
123.425 123.475		
Sean Tucker Power Aerobatics	118.700	122.875
122.950 123.150 123.450 123.475		
SIAI Marchetti SF260 Debbie Gary	123.150	
Showcopters	123.150	134.700
Sky Soldiers Demonstration Team (Army Aviation Foundation)	118.700	
123.025 234.500 242.400		
Skytypers Team	122.750	122.775
123.425 (Formation) 122.7750 123.150 123.425 123.450 (Solos)		

Swift Magic Aerobatic Team	122.775	122.925
Team Aeroshell	123.150	
Team Red	123.350	
Tora Tora Tora Warbirds Team (Commemorative Air Force)	118.750 122.850 122.875 123.150 123.450 469.500 469.550	
Foreign Military Flight Demonstration Teams		
Asas de Portugal, Esquadra 103 (Wings of Portugal 103 Squadron) Flight Team	262.150	
Battle of Britain Memorial Flight (BBMF) (UK)	120.800	122.700
Black Cats Royal Navy Helicopter Display Team (UK)		280.475
Blue Eagles Royal Army Air Corps Flight Team (UK)		135.950
135.975 136.975 382.000		
Blue Tango Helicopters	123.600	
Brazilian Air Force Team (Brazil)	130.550	130.650
132.250		
Brazilian Smoke Squadron (Brazil)	133.450	
British Army Red Devils Parachute Team (UK)	462.625	
Canadian Forces CF-18 Hornet Team (Canada) Frequencies are needed		
Canadian Forces Skyhawks Parachute Jump Team (Canada)	123.000	
294.700		
Falcons Royal Air Force Parachute Jump Team (UK)		255.100
256.900 465.100		
Frecce Tricolori Military Flight Team (Italy)		
123.475 (Ground Secondary)		
140.600 (Ground Primary)		
362.625 (Primary)		
263.250 (Secondary)		
307.800 Unknown		
Grasshopper Helicopter Team (Netherlands)	281.100	
Halcones Military Flight Team (Chile)	136.175	
La Patrouille Adecro Air Force Flight Team (France)		
121.850 123.600 138.450 141.825 143.100 143.850 242.650		
243.850		
La Patrulla Aguila Military Flight Team (Spain)	130.500	252.500
337.975		
Le Royal Jordanian Teams (Jordan)	123.500	
Les Breitling (Switzerland)	127.350	
Les Iskry (Poland)	123.600	
Marche Verte [Green March] (Morocco)		
135.000 135.925 (Ground)		
135.500 (Air-to-Air)		
Midnight Hawks Finnish AF Academy Demo Team (Finland)	140.625	
Patrouille Suisse Military Flight Team (Switzerland)		266.175
288.850 388.075		
Red Arrows Royal Air Force Flight Team (UK)	242.200	243.450
253.450		
Team Guinot Formation Wing Walkers (UK)	118.000	
Turkish Stars Military Flight Team (Turkey)	225.750	264.400
279.600		
Yak Aerostars Team (UK)	122.475	122.950
123.350 124.450		

In Closing

It is always difficult to predict what a new season will bring, so I strongly encourage readers to watch my *Milcom Blogspot* and the *Monitoring Times* home page for any late breaking news and frequency information during the 2009 air show season. You'll find the schedule for these airshows (as of press time) printed in the *Milcom* column on page 54.

If you attend an air show in 2009 and you find this article useful, please pass along any frequencies that you monitor, whether it is already on our list or not. Our goal each year is to have a report from every major air show at which a military team performs. This will greatly aid in the production of the next year's listing. You can reach me via our snail mail address at *MT Milcom*, 7540 Highway 64 West, Brasstown, NC 28902 or via e-mail at larryvanhorn@monitoringtimes.com.

Finally, I would like to extend a sincere thanks to the hundreds of contributors who took the time last year to share their post-show reports with us. I deeply appreciate the time and effort each of you took to let us know what you have heard at many of the air shows in 2008 and I look forward to reading and hearing about about what you intercept this year.

Now, break out those scanners, plug in those frequencies, and get ready for the ride of a lifetime – a front row seat at the air show!

"Blue Angel Delta - Stand by Boards — Boards!"

MT

Scanner Dan on the beach (David Gifford)



Monitoring the Air Show Experience

MT Air Show Equipment List

By Larry Van Horn, N5FPW

Now that you know who are the crack military flight demonstration teams and where to find the frequencies they use for air-ground coordination and other communications, we turn to another important consideration for successful monitoring: what equipment is required to listen in.

I am frequently asked which scanner I recommend for air show monitoring. While I don't have a favorite, I have prepared the list in the table below as a purchase guide of receivers that meet all the requirements as outlined below.

Not Just Any Old Scanner Will Do

Some scanners currently being marketed and most older scanners on the used market are *not* suited for air show monitoring. There are certain requirements your air show radio has to meet in order to successfully monitor the two major military aerial demonstration teams – the Blues and T-Birds.

If you are going to a Thunderbird show, you will need a scanner that can monitor the 138-150 MHz military land mobile band in the AM mode. Most of the older Uniden scanners cannot be used for air show monitoring due to their lack of independent transmission mode selection.

You also need a scanner that has the 225-400 MHz military aeronautical band in it. Most of the action (especially for the Blues) will be heard in this military UHF portion of the spectrum. Adding this criterion to the mix of possible radios narrows down our choice for air show scanners even further.

Information below includes current Grove Enterprises stock codes/prices (if carried by Grove) for the items indicated, but the price does not include shipping or taxes (if applicable). Prices are subject to change without notice, so be sure to call the Grove order department at 800-438-8155 or visit the Grove website at www.grove-ent.com for current pricing.

Air Show Listening Tip

If you are going to use a handheld scanner at the air show, there is another purchase you should consider: an extra set of charged batteries. Murphy's Law applies here and nothing is worse than having your batteries die halfway through the show with no replacements.

MILITARY AIR SHOW CAPABLE RECEIVERS

Note: Prices and availability subject to change without notice and you should call or visit the Grove website for the latest updates. This list is for reference purposes only. Radio listed with n/a are not available from Grove but are still being sold new from other MT advertisers such as Universal Radio.

Handheld Units

	Grove Stock No	Price
Alinco DJ-X3T	n/a	\$302.95
Alinco DJ-X7	SCN03	\$179.95
Alinco DJ-X30T	n/a	\$239.00
Alinco DJ-X2000T	n/a	\$769.95
AOR AR-8200 MK IIIB	SCN51	\$599.95
AOR AR-Mini B	n/a	\$299.00
GRE PSR-300	SCN13	\$199.95*
GRE PSR-500	SCN18	\$499.95***

Icom IC R-5 Sport	SCN12	\$174.95
Icom IC R-20	SCN20	\$539.95
Icom IC-RX7	n/a	\$364.00
Uniden BCD-396T	SCN47	\$499.95***
Yaesu VR-120D	n/a	\$180.00
Yaesu VR-500	SCN06	\$219.95

Base/Mobile Units

AOR AR-5000A+3B
AOR AR-8600 Mk IIB
GRE PSR-400
GRE PSR-600
Uniden BCT-15
Uniden BCD996T
Yaesu VR-5000

Grove Stock No. Price

RCV44P	\$2,569.95
SCN11	\$889.95
SCN14	\$199.95*
SCN19	\$499.95***
SCN15	\$229.95*
SCN48	\$499.95***
n/a	\$219.08

Computer Receivers

Icom PCR-1500
Icom IC-R1500
Icom PCR-2500
Icom IC-R2500
WinRadio WR-G305e
WinRadio WR-G305i
WinRadio WR-G305e/PD
WinRadio WR-G305i/PD
WinRadio WR-G315e
WinRadio WR-G315i
WinRadio WR-3150e
WinRadio WR-3150i-DSP
WinRadio WR-3500e
WinRadio WR-3500i-DSP
WinRadio WR-3700e
WinRadio WR-3700i-DSP

Grove Stock No. Price

RCV15	\$499.95
RCV25	\$599.95
RCV35	\$729.95
RCV52	\$899.95
RCV63	\$619.95**
RCV53	\$519.95**
RCV63P	\$719.95**
RCV53P	\$619.95**
RCV64	Contact Grove for pricing**
RCV54	Contact Grove for pricing**
RCV48-E	\$1,849.95*
RCV48-I	\$1,849.95*
RCV49-E	\$1,995.95*
RCV49-I	\$2,195.95*
RCV50-E	\$2,895.95*
RCV50-I	\$2,895.95*

Professional Receivers

AOR AR-Alpha	RCV01
AOR AR-One	RCV12
AOR AR-One-C	RCV13-G
AOR SR-2200	n/a
Icom R-8500	n/a
Icom R-9500	RCV27

Grove Stock No. Price

\$10,299.95	
\$4,699.96	Not available in a consumer version
\$5,199.95	Not available in a consumer version
\$1,299.00	Not available in a consumer version
\$2256.00	Not available in a consumer version
\$13,500.00	

Discontinued radios/scanners that are capable of air show monitoring

Alinco	DJ-X2T, DJ-X10T
AOR	AR-16B, AR-1000, AR-1500, AR-2515, AR-2700, AR-3000AB, AR-5000+3B, AR-7000B, AR-8000, AR-8200B, AR-8600B
Icom	IC-R1, IC-R2, IC-R3, R10, R100, R7000, R7100, PCR-100, PCR-1000
Kenwood	RZ-1
Radio Shack	Pro-2004, Pro-2005, Pro-2006, Pro-43
Uniden	BC-296*, BR-330T*, BC-796***
WinRadio	WR-1000i/e, WR-1500i/e, WR-3000i-DSP, WR-3100i-DSP
Yaesu	VR-120

* includes trunk capability

** Includes APCO-25 digital decoder

***Includes APCO-digital/trunk capability

MT

“If you cannot hear us, then that must be end of the world”

International Radio Serbia

By Eric Bryan

Serbia, which forms a union of republics with Montenegro, was part of Yugoslavia from 1945 to 1991. The Yugoslav communist party collapsed in 1990, and Bosnia and Herzegovina, Croatia, Macedonia, and Slovenia – all former republics of Yugoslavia – each proclaimed their independence in 1991. Serbia and Montenegro alone remained unified. In 1992, Serbia and Montenegro declared themselves the Federal Republic of Yugoslavia. In 2003 they formally changed their name to simply Serbia and Montenegro.

Though not a shortwave station with one of the most consistently heard signals in western North America, International Radio Serbia is nevertheless faithfully broadcasting in English in our direction almost every local evening. They even renovated the transmitters at their shortwave site in Bijeljina, Serb Republic, Bosnia and Herzegovina (confusing place names, aren't they?) in 2007, and now also broadcast over satellite. But if you're not hearing them well on shortwave (or even if you are), IRS's English-friendly website (also overhauled in 2007) is worth a look.

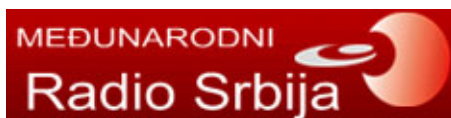
Serbian Radio Online

To access IRS's website, go to www.glass-rbije.org, and along the bar near the top of the page choose SELECT LANGUAGE, then click ENGLISH. This will land you on the NEWS/homepage, dominated by news stories focusing on Serbia and The Balkans. Most stories have an accompanying photo or image, and each has a printer icon to click for a printable version of the article. At last count, there were 150 pages of ten news stories each, going back three weeks.

To the right is a handy search bar for exploring the site and a short list of headlines under LATEST NEWS. Just beneath that is MOST READ, listing the most accessed sections of the website. Shortwave enthusiasts might be happy to see that the most popular section is IRS's shortwave transmission schedule. (The rest of the most read list is dominated by cultural and historical, rather than purely political, topics.)

Audio On-Demand

Below MOST READ is AUDIO NEWS.



Though this implies newscasts only, the entire current half-hour program in English is available here on demand. The broadcast is accessed via the RealPlayer -- simply press Play on the RealPlayer virtual console. There is also a link here to download the RealPlayer if you don't already have it on your computer.

International Radio Serbia describes its broadcasts and programming as “collage in nature.” Here is a sample of a broadcast accessed online:

News:

Serbia's agreement with the UN and EU over security regarding Serbs in Albania and Albanians in Serbia; report on Priština and Kosovo; the Russian ambassador in Belgrade; the UK and US ambassadors regarding Serbia; Serbia's suit against Croatia for genocide in 1991-1995; and Hungary's support of Serbia on its intended course for EU membership.

Press Review:

More on Serbia's suit against Croatia; the falling value of the dinar and Serbian citizens' average income; football/soccer; Serbian Diaspora conference in Belgrade; and anniversary celebration of the Serbian Academy of Sciences & Arts, established in 1886.

Music Telex:

Report on orchestral performances in Serbia; British version of the Glen Miller Orchestra plays in Belgrade; Irish blues guitarist Gary Moore and recent album *Close as You Get*; and selection from Belgrade Philharmonic played. (The music played during the broadcast was slightly distorted. It probably would have sounded better on a good clear shortwave signal.)

The broadcast finished up with station ID, shortwave frequency/schedule, website and contact information, and IRS's interval signal.

Though the broadcast on-demand is an excellent option for those who aren't hearing IRS well on shortwave, at the time of writing there are no podcasts offered on the website.

Serbian Government Site

Beneath AUDIO NEWS and the RealPlayer is a SERBIAN GOVERNMENT link. This takes you to the official website of the Serbian Government. Here there are more news stories centered on Serbia and The Balkans, all available in English. Coverage included more on the Serbian suit against Croatia; dual citizenship for residents of Serbia and Montenegro; Slovakia's support for Serbia's EU membership ambitions; Serbian government's purchase of 96,000 tons of corn; and the international conference on health management in Belgrade, aimed at improving Serbia's healthcare system.

There are also several links on the government site, including one called simply “Kosovo is Serbia.” This takes you to an open letter to the “Citizens of Serbia,” denouncing Kosovo's ambitions for independence. “As long as the Serbian people exists, Kosovo is Serbia,” it concludes.

Back on the IRS website, below SERBIAN GOVERNMENT is ARCHIVE, which is simply a list of links to news relating to the Serbian government, going back to October 2007.

Top Links

Back near the top of the page, in the bar which offers SELECT LANGUAGE, are several other links:

*POLITICS:
Focus on The Balkans.

PROGRAMME SCHEDULE

Period: 1100 UTC 26 October 2008 - 1330 UTC 29 March 2009

Time (UTC)	Time (Bgt.)	Language	Zones of area	Target	Freq. (kHz.)	Power (kW.)
00:30 - 01:00	01:30 - 02:00	SERBIAN 1 (Except Sunday)	7e,8 27,28w	N.AMERICA:ce EUROPE:w	6190	250
01:00 - 01:30	02:00 - 02:30	ENGLISH 1 (Except Sunday)	7e,8 27,28w	N.AMERICA:ce EUROPE:w	6190	250
00:30 - 01:30	01:30 - 02:30	SERBIAN (spec.) (Sunday)	7e,8 27,28w	N.AMERICA:ce EUROPE:w	6190	250
02:00 - 02:30	03:00 - 03:30	ENGLISH 2	6,7w 27,28w	N.AMERICA:ce EUROPE:w	6190	250
11:00 - 11:30	12:00 - 12:30	SERBIAN 2	27,28	EUROPE	7200	100

*ECONOMY:

Serbia's infrastructure projects; the IMF's assistance to Serbia; foreign investments in Serbia.

*SOCIETY:

Serbian Diaspora; media for the blind; *Lis-tener's Mailbox*; report on Serbia's national JAT Airways; tourism in Serbia; Serbia on the Internet; Serbia's Ministry of Religion.

*CULTURE:

Serbian theatre coverage; award to Banja Koviljaca spa, known for its healing, sulfur-mineral hot springs since the Middle Ages; museum of applied arts; wine as a link on paths of culture; preservation of tradition and cuisine.

*SPORTS:

Coverage of tennis, water polo, football/soccer, basketball, and handball.

*PRESS REVIEW:

More on the Serbian suit against Croatia; Italy's support of Serbia for EU membership; Serbia's inflation; special football coverage.

*IN THE FOCUS:

Romanian support of Serbia in not recognizing independence of Kosovo; 90th anniversary of the end of World War I; relations of Serbia with Great Britain.

And Four More

At the very top of the page are more links:

*Service:

A list of IRS personnel.

*The History of the Radio:

The story of the stations' 72 years of broadcasting. Here we learn that IRS is one of the oldest shortwave stations, being established six years before the Voice of America was. Broadcasts began in 1936 with the intent to counter fascist propaganda.

In 1941-1945, while Belgrade was being occupied, a free Yugoslavia station operated from Ufa in Russia. After the War, Radio Belgrade was

transmitting programs on shortwave for listeners around the globe. Radio Yugoslavia was then founded, taking over the foreign programs until 1954, when Radio Belgrade once more was in charge of overseas broadcasting.

In 1978, Radio Yugoslavia started operating independently of Radio Belgrade. After the end of the reign of Slobodan Milošević, in October 2000, the IRS resumed "regular programming."

*Programme schedule:

IRS's shortwave schedule. English to North America is listed for 0100-0130 UTC on 6190 kHz, daily except Sunday; and at 0200-0230 on 6190, with no Sunday exception noted.

*Contact us:

Opens Outlook Express to email IRS at radioju@sbb.co.yu

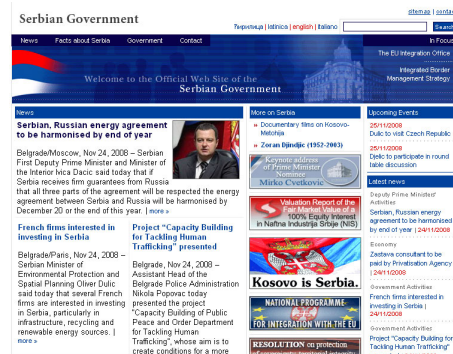
To reach IRS via post, their address is:

International Radio Serbia
Hilandarska 2
11000 Belgrade
Republic of Serbia

Shortwave Reception

In the Pacific Northwest, using a Degen DE1103 (a.k.a. Kaito KA1103) and a simple indoor wire, one evening here I found IRS's 0100 broadcast on 6190 present but barely accounted for. I expected an improvement with the 0200 broadcast, but it was undetectable. On another evening it was the other way around. In other words, it's been sporadic.

The low-key speaking style of the Serbian announcers doesn't translate well to shortwave. It would help if more broadcasters would adopt the dynamic, raised-voice style of speaking



used by the announcers at the Voice of Croatia. Though this is hugely annoying and overdone in our local and domestic radio and TV announcers (some of whom tend to shout), this method helps the modulation to cut through and over noise and fading on shortwave. There is a litany of shortwave broadcasters whose news and other speech would be more intelligible if they took this approach. The sleepy, almost mumbling delivery rarely makes it on shortwave. Imagine Radio Cairo's announcers speaking in a louder, more energetic manner (at least when their transmitters aren't suffering from severely low modulation).

But with the revamped shortwave transmitters, satellite broadcasting, and audio on-demand on their remodeled website, IRS says they are now entitled to revert to their old motto, almost a rallying-cry: "If you cannot hear us, then that must be end of the world."

MT

Did your Antenna System Survive the Harsh Weather?

Grove Scanner Beam Antenna II

A standard of unexcelled performance for more than 20 years, our world-renowned Scanner Beam has been improved to provide better directivity!

Ideal for 30-50 MHz low band reception, 54-800 MHz FM Broadcast and TV, 108-137 MHz aircraft, 137-174 MHz high band, 225-400 MHz military aircraft and satellites, 406-512 MHz UHF, and 698-960 MHz extended microwave mobile. The major lobe pattern is directional from 100-900 MHz, non-directional outside of that range.

HAMS NOTE: The Scanner Beam can be used for transmitting up to 25 watts on VHF/UHF with the following average VSWR: 50 MHz @ 1.9:1, 144 MHz @ 3:1, 222 MHz @ 3:1, and 430 MHz @ 1.5:1.50-72 ohms nominal impedance. May be used with inexpensive TV antenna rotator or fixed in favored direction. Local signals still come in loud and clear from all directions. Balun transformer, offset pipe and all mounting hardware included (requires TV type F connector on your coax).



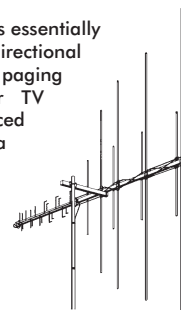
Order ANT05
Only \$29.95*
plus \$3 UPS Ground shipping

Grove Omni II VHF-UHF Antenna

Designed by Bob Grove, this exclusive Grove product offers 25-1300 MHz coverage; lightweight, compact design, high performance, and low cost! Designed especially for wide-area metropolitan listeners, the 68" Omni can be mounted on a mast, in an attic crawl space, against a wall—just about anywhere convenient.

BONUS FEATURE! Although the Omni is essentially non-directional, a metal mast gives it useful directional properties. Overload interference from paging transmitters, weather stations, FM or TV broadcasters, or other sources may be reduced or eliminated when positioning the antenna on the mast at the time of installation! Similarly, a distant, weak signal may be peaked by the same technique!

Balun transformer with F connector, offset pipe, mounting hardware and full instructions included.



Order ANT18
Only \$64.95*
plus \$9.95 UPS Ground shipping

Accessories:

50' RG-6U	CBL50	\$19.95
100' RG-6U	CBL100	\$24.95

plus \$3 shipping each

GROVE
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fax: 828-837-2216
7540 Highway 64 West
Brasstown, NC 28902

Monitoring California's Central Valley

By Bruce Ames KE6HPK

"What are we having for dinner?"

"There will be no dessert for you tonight unless you clean your plate of all the vegetables!"

How many times have we heard those two statements over the years?

I am sure that you have heard many times that California feeds this great country of ours, but have you actually thought of where exactly in California is this great cornucopia and what do we grow? As a radio hobbyist, have you wondered what there is to monitor in this area?

The agricultural area to which I'm referring is known as the San Joaquin Valley or the "Central Valley." Each location is technically a separate location, although the term "Central Valley" is better known, at least in this part of California. Generally speaking, the area runs from Stockton south to the City of Bakersfield, a distance of roughly 350 miles. East and west, the boundaries are west from Stockton to the mountains of the Coast Range, east to the Sierra Nevada range, with the southern end at the Tehachapi Mountains near Bakersfield. The two main traffic arteries are Interstate 5 and CA Route 99.

The San Joaquin Valley is roughly 42,000 square miles, making it about the same size as Tennessee and Virginia. Within the vast expanse of the valley lies a large system of interconnected canals, streams, and other water sources. Approximately 6.5 million people live in the Central Valley today, and it is the fastest growing region in California.

As indicated, the primary industry within the Valley is agriculture, although oil fields are found in Coalinga and Bakersfield. Excellent soil, weather, and growing conditions make it one of the most productive agricultural regions in the world. In fact, it is commonly referred to as the "fruit basket of the world." Virtually all crops can be grown in the vast valley, but it is America's primary source for tomatoes, almonds, grapes, raisins, cotton, and apricots.

According to the 2002 Census, four of the top five counties in agricultural sales are located in the Central Valley: #1 Fresno County, #2 Tulare County, #4 Kern County, and #5 Merced County.

Riding the Rails

The huge amount of produce that needs to be swiftly shipped across the country to ensure freshness at your local grocery store requires a huge infrastructure of transportation methods, predominantly trucking and railroads. These shippers operate every day, seven days a week, and are generally found in the CA-99 corridor. Truck traffic is heavy all of the time and the railroads (Burlington Northern Santa Fe - BNSF) and the Union Pacific (UP) seem to have back to back trains virtually every couple of minutes. For you rail fans, it is not uncommon to see every train with motive power of five to seven engines.

As more and more people migrated from the San Francisco Bay Area and Los Angeles in search of a slower life or reduced housing prices, many of these trains were carrying car after car of construction material. When the new housing bubble burst, fewer trains are loaded with construction materials; however, that has not slowed down the inter-modal transportation for agriculture.

The Burlington Northern Santa Fe (BNSF) Bakersfield subdivision runs from Bakersfield to Calwa, roughly four miles south of Fresno. At Calwa, it becomes the Stockton subdivision and runs to the Bay Area. The Union Pacific's (UP) Fresno subdivision runs from Sacramento to Bakersfield. Currently, Amtrak operates six daily *San Joaquin* trains over these lines.

UP North of milepost 138.9 Arena-Elvas

160.875	Elvas-S. Florin
160.230	Elk Grove-Arena
160.890	PBX

UP South of Arena-N. Bakersfield

160.230	Arena-Notarb
161.550	Notarb-Bakersfield
160.950	160.890 PBX

BNSF Bakersfield-Calwa (MP 994.9)

160.935	Calwa
161.370	Bakersfield Dispatcher
160.425	PBX Fresno

BNSF Calwa-Stockton

161.145	Calwa
160.650	Stockton dispatcher
160.335	PBX

The last major player in the valley railroad scene is the San Joaquin Valley Railroad which is considered a short line railroad. They operate roughly 207 miles of track in the valley with trackage rights on the UP and BNSF. Their road

channel is 160.365. They also use the radio frequencies of the BNSF and the UP.

National Parks

Within the confines of the Valley lie three major National Parks. They are Yosemite National Park, Kings Canyon National Park and Sequoia National Park.

Yosemite

It would be very difficult to find any one within the United States that has not heard of Yosemite and possibly a little of its history.

Yosemite is located in the eastern portions of Tuolumne, Mariposa and Madera Counties and reaches over the western slopes of the Sierra Nevada Mountains. The park is 1,189 square miles or 761,266 acres and is visited annually by over three and a half million visitors per year. Many of these visitors only spend time in the seven square miles of Yosemite Valley; almost 95% of the park is designated as wilderness.

Although not the first of the national parks, Yosemite was a focal point in the development of the national parks, thanks to the hard work of people like John Muir and Galen Clark. The park ranges from 2,000 to 13,114 feet above sea level and contains 7,000 plant species.

One of the most popular rock-climbing destinations in the world is the granite cliff *El Capitan*. The image most associated with Yosemite is another granite cliff, the 4,800 foot high *Half Dome*. The high country of Yosemite contains many beautiful areas for viewing, hiking, and other recreation such as Tuolumne Meadows, Cathedral Range, and three groves of ancient Giant Sequoia trees. These trees are the largest trees in the world in terms of mass and are among the tallest and longest-lived.

Arguably, the most famous hotel in the national park system is Yosemite's *Ahwahnee*. It is interesting to note that for years the Yosemite Park and Curry Company ran the park's concessions. The late '70s saw several sales and ownership changes. In 1993, Matsushita, a Japanese company, was going to have control over the concession sales. The Secretary of the Interior objected to a foreign company operating concessions in a national park, and the sale of the concessions company was transferred to the federal government. The park concession contract is now operated by Delaware North Companies.

Yosemite dispatch is located in the town of El Portal just off Highway 140. Dispatch uses

the call sign "Yosemite." There is supposedly a zone set up for P25 digital operation; however, I have no frequencies for it.

Yosemite Law Enforcement (Analog)

151.895	Concession Security
154.920	Interoperation
155.160	Search and Rescue
155.475	Interoperation
154.920	CLEMARS
163.100	Traffic control
166.300	Valley Net local and repeater (depending on input)
166.850	Operations
168.350	Common
170.000	Air-Ground
172.650	Local and repeater (depending on input)
172.775	Fire Repeater

Yosemite Fire

151.325	CalFire Tac 6
151.340	CalFire Tac 7
151.370	CalFire Tac 8
154.280	White – Interagency
164.150	Tactical
168.150	Stanislaus National Forest Net (admin)
168.200	FIFC Tac 1
168.600	FIFC Tac 2
168.600	FIFC Tac 3
168.750	Stanislaus National Forest Net (fire)
171.475	Sierra National Forest (Admin)
172.225	Sierra National Forest (Fire Dispatch)
172.775	Fire Repeater Net

Mutual Aid

153.995	Mariposa Sheriff
156.075	Calcord
166.125	Public Works

Misc.

151.430	Fish and Game
136.075	Air

Delaware North Corporation (DNC)

Operates at town of Fish Camp – south entrance to park. All DNC operations:
451.300, 451.900, 451.950, 452.175, 452.175, 452.450, 452.800

Ahwahnee Hotel (DNC)

151.805	Maintenance
151.895	Maintenance and Security (depends on PL tone)

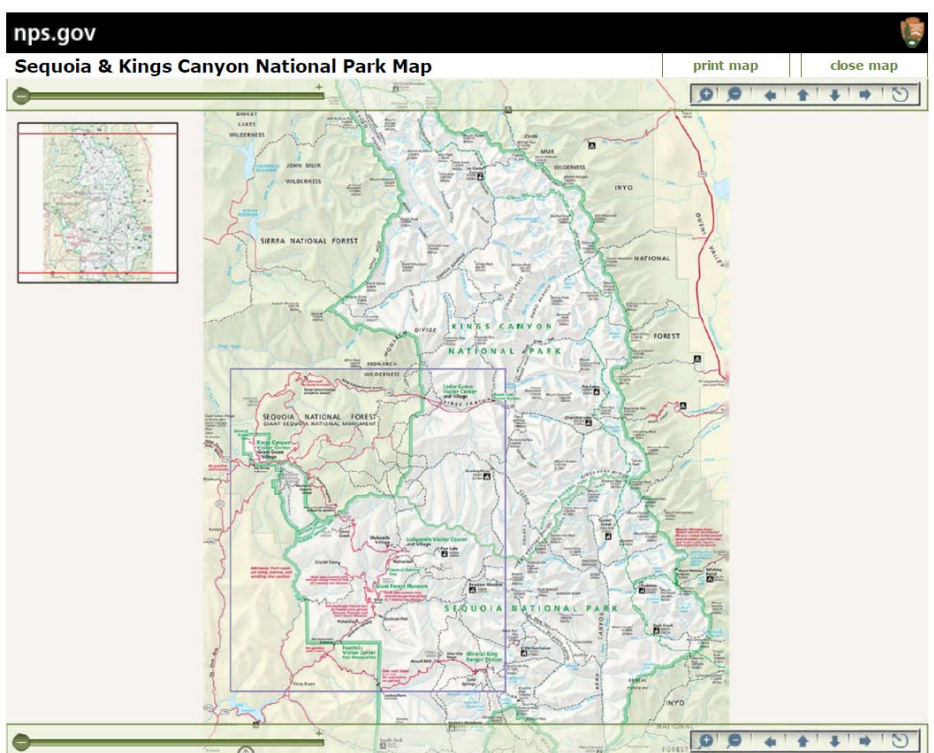
Yosemite Concessions (DNC)

47.850	Operations
47.620	Operations
151.925	Operations
154.515	Shuttle Buses
151.685	Security, Housekeeping, Utility, Maintenance (depends on PL tone)

Kings Canyon National Park

This park is in the southern Sierra Nevadas east of Fresno. Established in 1940, the park covers 462,901 acres and incorporates the Sequoia National Park and is operated by the National Park Service (NPS) as one unit.

The Sequoia National Park is named for the majestic Giant Sequoia trees which populate thirty-eight groves within the park boundaries. The second largest Giant Sequoia tree in the world is the *General Grant* with a base of 40.3 feet; President Calvin Coolidge proclaimed it the "Nation's Christmas Tree" in 1926. An interesting factoid is that in 1956, President Eisenhower declared the tree to be a national shrine, a memorial to all those who died in war. It is the only



living object to have such a declaration. Truly imposing.

The forest covers 1,787 square miles and contains over 2,500 miles of road and 850 miles of trails. There are a number of camping and recreational facilities. Lately, the forest has also been a growing area for illegal marijuana cultivation sponsored by alleged Mexican drug cartels.

Sequoia National Forest is also home to Mt. Whitney, the tallest mountain in the contiguous forty-eight states.

164.520	Cedar Grove/Lodgepole
164.750	NPS South
164.800	NPS North
168.350	NPS Work/Project
168.650	Air – Ground
171.750	NPS Back Country
172.200	South end of park
173.7875	Grant Grove/Lodgepole

California Highway Patrol

The premier law enforcement agency in the state is the **California Highway Patrol (CHP)** which is responsible for five department goals:

- Manage Traffic and emergency incidents
- Prevent loss of life, injuries, and property damage
- Maximize service to the public and assistance to allied agencies
- Protect public and state assets
- Improve departmental efficiency.

Several years ago, the California State Police was disbanded and their personnel and State protection responsibilities were rolled into the CHP. In addition to their well-known presence on the highways, they are also responsible for protection at all state buildings and VIP protection.

For the past twenty years, they have been "studying" the problem of migrating to 800 MHz trunking. Currently, they are still on VHF lo-band. In summer, it is not uncommon to hear the CHP via skip in the eastern United States.

The CHP was one of my customers before I retired, and I once asked one of their radio engineers what was the hold-up on migrating to 800 MHz. He stated that a signal at 800 MHz is resonant with the pine needles on the endless trees found in the Sierra Nevada chain. They have so many communities and hamlets in the mountains, that using 800 MHz would result in many dead spots and would be an unsafe operation for their motor officers. Staying on lo-band avoids this phenomenon.

In order to make it easier to understand the radio coverage, the CHP breaks down their offices and respective frequencies into colors. As the state is so large, many colors will be repeated.

Sacramento Dispatch Center

42.460	S. Sacramento (Black)
	Stockton Dispatch Center
	Stockton (White)
	Merced Dispatch Center
	Modesto/Sonora (Yellow)
	Merced/Mariposa/Chowchilla/Madera/Los Banos (Orange)
	Fresno Dispatch Center
42.080	(Silver)
42.440	Porterville/Coalinga/Hanford/Visalia (Pink)

CHP Aircraft

122.850	Primary
122.875	Secondary
123.025	Helicopter Air-Air
122.750	Fixed Wing Air-Air

Special Freqs

42.340	(Blue) Statewide common – if there is an emergency happening it will be on the "Blue"
42.400	Stockton Disaster Assistance Response Team (DART)
45.020	(Ivory) Special Assignments. Frequently used for speed enforcement. In Fresno County, it is used as designator of "Fresno Task Force."
154.905	Mobile Extenders
154.920	California Law Enforcement Mutual Aid Radio System (CLEMARS)

There are also a series of frequencies used by the CHP on UHF. Supposedly these are used for special operations and for Homeland Security. You may hear the lo-band channels rebroadcast on the Division Channels.

460.0125 Common tactical & mobile repeaters
460.025 CLEMARS
460.450 Central and Valley Divisions
460.0875 TAC-1
460.2125 TAC-2
460.3375 TAC-3
460.0875 TAC-4

If you like to monitor the CHP, check out their online Computer Aided Dispatch web site. The site allows you to plug in any CHP and see in real time the status of the incident, units on scene or responding, etc. It is also a great site to

use before one heads out on the daily commute.
<http://cad.chp.ca.gov/>

FRESNO COUNTY

Fresno is the capitol seat of Fresno County and the unofficial capitol and hub of the Central Valley. The county name means "ash tree" in Spanish. It came by that name from the abundance of mountain ash trees in the county. The original capitol seat was the small town of Millerton, but due to many floods which caused such massive destruction, the seat was moved to nearby Fresno. The old Millerton Courthouse is now a museum and visitor center, restored as an 1866 courthouse.

Local residents brought irrigation and canals, electricity and agriculture to the area.

These canals transformed the barren desert of Fresno into some of the richest agricultural soil found in the United States. Today Fresno County is now the nation's leading agricultural region.

The city of Fresno is the sixth largest city in California after (1) Los Angeles, (2) San Diego, (3) San Jose, (4) San Francisco and (5) Long Beach and is located about 50 miles south of Yosemite. As of 2008, Fresno County is the tenth most populous county in California with an estimated population of 931,098.

The City of Fresno is the largest city in the United States not directly served by an interstate highway. Prior to the federal economic meltdown and the budget mess that plagues California, there were long-term plans to upgrade California State Highway 99, which is the main freeway through the area, to interstate standards. It is unofficially proposed to be Interstate 9.

Fresno is a great place to start a vacation. The city is roughly 1-1/2 hours from Yosemite, 4 hours to either Los Angeles or to San Francisco, 3 hours to Sacramento, and 2-1/2 hours to the coast. One may even drive to Las Vegas from Fresno in roughly 7 hours.

FRESNO COUNTY (in order of channel assignment)

Sheriff

153.665 Agency Interop / Search & Rescue
153.920 & 155.580 Orange Area 1 West
154.650 Local Link
154.755 Area 2 Metro
154.875 Red - Tac 2
154.900 Tactical
154.950 Jail 10
155.160 National Search & Rescue
155.370 Jail 8
155.475 National Law Enforcement Mutual Aid Radio System (NALEMARS)
155.520 Jail 9
155.565 Court Bailiffs
155.655 Area 3 South
156.075 California On-Scene Emergency Coordination Radio Plan (CALCORD)

160.545 & 160.590 Area 4 Mountains
160.695 Tactical

County Government

153.800, 155.415, 151.085 Roads A
151.130 Roads B
153.500 Shaver Lake Water
151.100 Roads Dept. Flaggers
153.140, 153.965 Sanitation District

Fresno County Fire Protection District

154.445, 153.890 District 2
158.745 District 3

EMS

453.300 Metro Dispatch
462.975 Rural Dispatch

Table Mountain Casino in Friant, CA an Indian Rancheria and features Las Vegas-style gaming and shows.

Motorola Type II Analog
935.6875, 936.250, 937.1375, 937.675 (Control), 938.1625

California State University (Fresno State)

453.050 CSU Fresno F2
453.125 CSU Fresno F1



Fresno City Police

460.050	Southwest
460.275	Central
460.325	Southeast
460.400	Northwest
460.475	Northeast
460.250, 460.425, 460.025	CLEMARS
460.300, 460.500, 453.100	Airport Public Safety

Misc.

151.490	Four Points Hotel (Sheraton)
451.725	Fresno Fashion Fair Mall
452.3875	Goodwill
452.650	Fresno Buses (FAX or Fresno Area Express)
452.800	FAX
453.000	Fresno Bee (newspaper)
461.650	Kaiser Hospital
466.0625	Fresno Rescue Mission
466.1125	Fresno Rescue Mission
854.8125	Fresno Unifier School District
855.8125	Fresno Unified School District

Fresno Yosemite International Airport (FAT)

ANG	298.3 (ANG Call sign Griffin Operations)
ANG Ops	132.0 255.8
Approach	118.5 119.6 132.35 268.7 323.25 351.95
ATIS	121.35 273.6
Clearance	124.35 348.6
Departure	118.5 119.6 132.35 268.7 323.25 351.95
Emergency	121.5 243.0
Fire/Crash crews	163.4625
Ground	121.7 348.6
Tower	118.2 251.1
Weather ASOS	(559) 255-3413
American Airlines	128.95
Scott FBO	122.85

Fresno area

Low discrete	123.8
Low	126.9
High	132.8
High	132.8
High	133.7
High	281.5
High	285.4

The California Air National Guard Base at FAT is home to the 144th Fighter Wing whose mission is air defense protection from Oregon to the Mexican Board. They fly the F-16C Fighting Falcon. Their secondary mission is to support the nation's Counter Drug Program when requested by the Governor. For more history on the 144th, visit www.144fw.ang.af.mil

This year, FAT (referred to as FYI by the locals) has installed the largest solar airport installation providing "40% of the power supply to run the day-to-day needs of the airport such as lighting, air conditioning, controls, and tower comms." The solar installation has been constructed on land near the runways that previously was unusable.

Fresno Chandler Field (FCH)

FCH is the municipal airport for the area. Have you seen the latest Harrison Ford movie "Indiana Jones and the Kingdom of the Crystal Skull?" Some of the external airport scenes for the old-time Mexican airport were filmed at FCH.

Approach	119.0 119.6
CTAF/Unicom	123.0

Departure	119.0
Weather AWOS-3	135.225 (559) 488-1040

City of Clovis

Clovis is a very modern city, but it also has an historic shopping district full of quaint antique and specialty stores. Its many restaurants offer visitors a blend of old-time hospitality with a turn of the century atmosphere and western tradition. There are many community festivals in Clovis, such as the Rodeo, Big Hat Days, the Strawberry Jamboree, and numerous antique and collectible fairs. There is also a weekly farmers market which features free entertainment in the park.

460.225	PD Tac 5
453.6625	Public works
154.235	Fire Dispatch

Schools	
452.275	Clovis Unified School District
452.400	Clovis Unified School District
452.400	Clovis Unified School District
461.075	Clovis Unified School District

City of Coalinga

Coalinga is one of the few cities in California that began as a mining boom town and survived. There is the R.C. Baker Museum that features many local historic exhibits such as a fossil collection, American Indian artifacts, and antiquated oil-field equipment.

453.750	Fire Dispatch
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Pleasant Valley State Prison Coalinga	
Motorola Type I	
858.2625 859.2625 860.2625	(control)

City of Kingsburg

Kingsburg is a traditional Swedish town whose culture is preserved in the annual Swedish Festival. The downtown section is known as the Swedish Village, featuring brightly colored Swedish architecture, Swedish flags, and bay trees. Other annual traditions are the Crayfish festival and Santa Lucia Day.

154.175	Fire Dispatch
462.3125	Sun Maid Growers of CA

City of Sanger

Sanger is located in the heart of the Blossom Trail (www.gofresnocounty.com/BlossomTrail/BlossomIndex.asp) and Fruit Trail country. Sanger is centrally located to Kings Canyon and Sequoia National Parks as well as to a variety of agritourism venues where one may sample farm fresh produce and local wineries. Sanger is also known as the nation's "Christmas Tree City." 154.340 Fire Dispatch

City of Selma

Selma is the raisin capitol of the world, where 90% of the world's raisins are grown within a 10 mile radius. Check out the annual Raisin Festival.

155.130	PD Pri Dispatch
154.920	CLEMARS
155.550	PD Kingsburg Dispatch
155.250	PD Fowler Dispatch
154.415	FD Dispatch

KINGS COUNTY

Sheriff

460.125	Dispatch
Secondary	
460.550	Talk-around
460.525	Tactical

Fire – EMS

458.1875	Ambulance car-car tactical
460.600	Fire-EMS Dispatch
460.75	Fire-EMS Tactical
460.625	Fireground
461.575	County EMS Dispatch
462.975	Region wide ambulance tactical

City of Corcoran

460.300	PD Dispatch
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California State Prison – Corcoran

Motorola Type II	
855.2125 856.2125 857.2625 858.2625	
859.2625 860.2625	(control)

City of Hanford

Hanford is the county seat for Kings County and is a hub for agriculture.

460.200	Police Dispatch (P25)
460.375	PD Tactical (P25)

City of Lemoore

The primary business within Lemoore is Naval Air Station Lemoore. This is the home of Strike Fighter Wing Pacific and Squadrons VFA-2, VFA-14, VFA-22, VFA-25, VFA-27, VFA-41, VFA-94, VFA-97, VFA-102, VFA-113, VFA-115, VFA-137, VFA-146, VFA-147, VFA-151, VFA-154, VFA-192 and VFA-195. The sprawling base also is home to Fleet Readiness Center (West) Weapons School and training squadrons VFA-122 and VFA-125.

All squadrons fly the *F/A Hornet* and the *Super Hornet*. The mission of the school is teaching ordnance loading procedures to graduate level training covering every aspect of F/A-18 weapons employment including mission planning, tactics, weapons systems and ordnance handling. The overall goal is to ensure all squadrons are prepared to enter any combat contingency and win.

The current primary airspace that NAS Lemoore (and Fresno ANG) uses is the restricted military operating area (MOA) R-2508, which is located in the China Lake/Edwards AFB complex. The aircraft are currently training in airspace up to 200 miles from the base, requiring a considerable amount of fuel and time just to fly to and from the training area.

NAS Lemoore

Approach	118.15 286.0
ATIS	121.575 267.6
Base Ops	299.3
Clearance	124.1 380.8
Departure	118.15 124.1 318.8
Emergency	121.5 243.0
Ground	121.65 305.2
MOA Advisory	134.225 290.325
PMSV Metro	317.0
Radar	125.95 264.5 270.8 285.7 301.2 309.9 314.0 336.4 344.4 363.7 383.6 383.9
Tower	128.3 340.2
Weather AWOS-3 (559)	998-2336
Also try	343.8 (low) 353.8 (low discrete)

Tachi Palace Indian Casino, Lemoore	
461.6875 461.8625 463.4625	

TULARE COUNTY

Tulare County is further south along the CA-99 corridor and, as part of the extensively fertile valley, the county qualifies as the second largest producer of agricultural commodities in the United States. The county is also home to substantial packing and shipping operations.

Tulare is the international host of the World Ag Expo, usually held in February at the International Agri-Center Complex. It is the world's largest farming show, displaying the latest in agricultural equipment. This show attracts attendees from all over the world and hotels are typically booked months in advance.

Sequoia National Park and National Forest are approximately 45 minutes from the city of Tulare. The largest tree in the world (*General Sherman*, 275 tall) is in the Sequoia National Forest east of Visalia. The tree is believed to be somewhere between 2,300 and 2,700 years old.

Sheriff

453.475 Dispatch south
453.650 Dispatch North
453.800 Mutual Aid
453.975 Tactical/Admin

Fire/EMS

153.905 Fire Tactical Secondary
154.100 Fire Dispatch (Fire Comm)

EMS Field to Hospital

462.950 Co. Dispatch
463.125 Kaweah Delta Hospital

Municipal Services

151.055 Resource Management Agency
154.100 General Services Agency (GSA)
453.425 Housing Authority

Misc.

163.4125 Army Corps of Engineers (Ch 1)
163.4375 Army Corps of Engineers (Ch 2)
166.3750 Bureau of Land Management (Admin)
166.4875 Bureau of Land Management (Fire)

City of Dinuba

Dinuba is an agricultural town that is home to Ruiz Foods in addition to a production facility for the juice company Odwalla. There is also a "Best Buy" distribution center on the west side.

453.225 PD Dispatch
453.250 PD Secondary

Fire/EMS

154.085 Fire/EMS Tactical F2
154.385 Fire/EMS Dispatch F1

City of Porterville

In addition to agriculture, Porterville is home to the oldest high school band in California: the Porterville Panther Band, started by Mr. Frank "Buck" Shaffer.

453.200 PD Dispatch Ch 1
453.675 PD Secondary Ch 2
453.950 PD Tactical Ch 3

Fire/EMS

155.865 Fire/EMS Tactical
156.000 Fire/EMS Dispatch

City Services

152.230 Transit
15.115 Public Works

155.205 Porterville Unified School buses
155.805 Public Works

168.675 Sequoia National Forest (Dispatch)
168.775 Sequoia National Forest (Fire)

City of Tulare

When I write articles, I enjoy including information about the target rather than just frequencies. An interesting factoid about the city of Tulare is that it is home to quite a few notable residents. Two famous Tulare residents are Elmo Zumwalt Jr. and Donald Turnupseed.

Donald who? He was the driver that collided with and killed the famous actor James Dean in a September 1955 car crash. Dean was driving his Porsche 550 Spyder prior to a race in Salinas CA.

Elmo Zumwalt was Chief of Naval Operations (CNO) 1970-1974. He became Commander Naval Forces, Vietnam, and Chief of the Naval Advisory Group, U. S. Military Assistance Command, Vietnam (MACV), and was promoted to Vice Admiral in October 1968. Vice Admiral Zumwalt was the Navy adviser to General Creighton Abrams, the commander of all US Forces. Zumwalt, when he became CNO, authored the infamous 1970's "Z" grams.

PD Dispatch (primary)

453.3625 PD Dispatch (secondary)

Fire/EMS

154.355 Fire/EMS Dispatch
156.180 Fire/EMS Tactical

City of Visalia

Settled in 1852, it is the oldest permanent inland settlement between Stockton and Los Angeles. It is the county seat and largest city of Tulare County and serves as the economic center of the most productive single agricultural area in the United States. It is sometimes referred to as the "Gateway to the Sequoias. Downtown Visalia has an old-time flavor and abounds with the beautiful restored Fox Theatre and many shops and restaurants.

453.575 PD Dispatch (primary)
453.775 PD Secondary

Fire/EMS

154.130 Fire Tactical
154.325 Fire/EMS Dispatch

City Services

153.860 Building Inspectors
153.935 Transit
154.965 Sanitation, street, parks
855.9875 Visalia Unified School District

KERN COUNTY

Kern is generally considered to be the southernmost county in the lush San Joaquin Valley. The warm semi-arid climate is ideally suited for the growing of citrus, carrots, almonds and pistachios. Bakersfield is the county seat.

Kern County is a significant producer of oil, natural gas and wind-turbine power. In 2004, Kern County was the state's top producing county of oil and has over 85% of the state's 43,000 active oil wells. Three of the five largest oil fields in the country are located in Kern County.

Sheriff

453.050 Metro Dispatch (Bakersfield)
453.375 West Tactical
Metro Tactical (Bakersfield)
460.100 West Dispatch
460.125 East Tactical
460.150 SWAT, Narcotics, (freq encrypted)
460.175 Probation
460.225 East Dispatch
460.575 Admin

Detention

453.325 Minimum Security
453.5375 Medium/Maximum security
453.500 Maintenance
453.6375 Central Receiving Facility
453.7625 Minimum Security
453.8125 Juvenile

Fire

151.100 East Command – Battalion 1
151.1375 Kern 5 Tactical
151.475 Kern 2 Tactical
153.785 Countywide Dispatch
154.860 West Command – Battalions 3,6
155.625 Primary – Battalions 2,4,7
155.7525 Kern 6 Tactical
155.880 Countywide Secondary
158.7375 Kern 3 Tactical
159.4725 Kern 4 Tactical
453.2625 Kern River Canyon

EMS

452.350 Care Ambulance
452.775 Hall Ambulance East Dispatch
463.175 Kern Ambulance
463.125 Ambulance – West/Central County (Hall Ambulance)
463.475 Liberty Ambulance

County Municipal Services

453.225 Mutual Aid
453.200 Animal Control
453.400 Public Works Roads & Bridges
453.450 General Services Agriculture
453.5125 Kern Co. Medical Ctr. Security
453.700 Public Works Parks

Casino

151.570 Golden West Casino
159.585 "
159.660 "
159.7875 "
160.050 "

Misc.

461.0375 Target Stores Distribution Center
462.9125 "
466.2875 "
469.4875 "
452.750 Cal State Bakersfield

City of Bakersfield

Bakersfield is the county seat of Kern County and is one of the fastest-growing large-population cities in the country. It sits ideally at CA-99 almost exactly halfway between Fresno and Los Angeles, 110 miles in either direction. It is the 11th largest city in California and California's third largest inland city after Fresno and Sacramento.

If you are a country music fan, Bakersfield was made famous by Buck Owens and Merle Haggard who developed a streamlined country music style called the "Bakersfield Sound." This is a spin-off of the honky-tonk style of country music made famous in Texas. Today, Bakersfield is third in country music fame behind Nashville and Texas. If you visit Bakersfield, be sure to stop in and see a show at the Buck Owens Crystal Palace right off 99.

Police

154.740 PD 4 Tactical
154.800 PD 2 Tactical
155.190 PD 3 Tactical

155.310 PD 1 Dispatch
 155.430 PD 6 Tactical
 155.550 PD 5 Tactical
Fire
 153.950 FD 2 MetroNet
 154.070 FD 1 Dispatch
Public Works
 153.875 Sanitation
 153.995 Equipment
 154.115 Paging

Bakersfield – Meadows Field (BFL)

Approach 118.8 118.9 270.3 284.625
 ATIS 118.6
 CTAF 118.1
 Departure 126.45 270.3 284.625
 Emergency 121.5 243.0
 Ground 121.7
 Security 453.350
 Tower 118.1 257.8
 Unicom 122.95
 Weather ASOS (661) 393-3766
 Epic Jet Center 131.175
 Loyd's Aviation 130.9

Approach and Departure Service is provided by LA ARTCC on 127.1 and 317.7 when BFL Approach is closed.

City of Delano

Delano is famous for three things, one it is a hub for the growing of table grapes; two, it was a major facility for the shortwave transmitters and broadcasting antennas of the Voice of America; and three, in 1965 it was famous for the Agricultural Workers of America walking off the grape farms to achieve better working conditions and wages for the farm works. Thus began the famous "Delano Grape Strike." One week later the activist Cesar Chavez, in a show of force and unity, formed the United Farm Workers of America. Odds are that the grapes you eat today came from the farms around Delano.

460.325 Police Dispatch
 460.400 Police car-car

Kern Valley California State Prison

Motorola Type II
 857.2375 857.9625 858.9625 859.9625
 860.9625 (control)

MARIPOSA COUNTY

The county is on the west side of the Sierra Nevada Mountains and the county encompasses parts of Sierra National Forest, Stanislaus National Forest, and Yosemite National Park. The county claims that it has no permanent red lights anywhere in the county. The nearest airports with scheduled flights are in Fresno and Merced.

153.995 Sheriff Dispatch
 156.195 Public Works
 158.820 Public Utility District
 158.896 Sheriff Tactical

MADERA COUNTY

The county was named when the California Lumber Company built a log flume to carry lumber to the railroad there in 1876. The name means lumber in Spanish. The southernmost part of Yosemite National Park is in the northeast part of the county. South and West is Fresno County. North and West is Merced County and North is Mariposa County.

Madera's claim to fame is its location as the geographic center of California. Just north of the

city limits of Madera, the state center is marked by two trees on CA-99. The palm tree represents the southern half of the state and the evergreen tree is symbolic of the northern half.

Sheriff

150.995 Dispatch
 151.070 Tactical
 151.115 Tactical
 155.970 Jail

Fire

151.400 Command 4 (Fire-Talk)
 151.460 Dispatch
 153.185 Madera Command
 154.355 Valley Tactical
 451.425 EMS Tactical

City of Chowchilla

Talk about an infamous town! In July 1976, national headlines were made with the kidnapping of a school bus of twenty-six children and the bus driver. They were driven around in two vans for 11 hours prior to being forced into a moving van and buried in a quarry in Livermore CA. After much digging, they were finally able to escape after sixteen hours. The three kidnappers were found guilty and sentenced to life in prison.

Fire

453.750 Dispatch
 Valley State Prison for Women Chowchilla
 Motorola Type I
 8757.2625 858.2625 859.2625 860.2625
 (control)

City of Madera

Police

453.150 Police Records (P25)
 453.400 Police Tactical (P25)
 453.725 Police Dispatch/Patrol (P25)

Fire

453.750 Dispatch

EMS

154.070 EMS-Talk, "Valley Command"

MERCED COUNTY

Merced County was formed in 1855 from parts of Mariposa County. Parts of its territory were given to Fresno County in 1856. The county derives its name from the *El Río de Nuestra Señora de la Merced* (River of Our Lady of Mercy); so-named in 1806 headed by the explorer Gabriel Moraga.

Much of the county is on the Merced trunk system.

County Public Safety

Motorola Type I
 862.2375 856.7625 857.2375 858.2375
 859.2375 860.2375 860.4625 862.7125
 (control) 864.7125 (control) 865.7125 (control)
 This system supports public safety for the County Sheriff, Cities of Atwater, Dos Palos & Livingston.
 County Public Safety not on trunk
 154.340 Fire Tactical
 154.400 Fire Dispatch

852.4875 University of California Merced (P25)

US Penitentiary Atwater – located on a portion of the former SAC Base Castle AFB

Motorola Type II
 408.375 411.1750 412.475 413.775 413.300
 – Note: All frequencies except 408.375 have been used as the control channel

City of Los Banos

153.815 Public Works

154.040 Public Works
 154.310 Fire Dispatch
 154.815 Police Dispatch
 155.025 Public Works
 858.2125 PD Operations (P25)

City of Merced

154.130 Fire Tactical/Secondary
 154.175 Fireground
 155.805 Fire Dispatch
 155.520 Police Tactical/Secondary
 155.955 Police Dispatch
 464.675 Merced Mall Security

STANISLAUS COUNTY

Stanislaus County is located between Fresno and Stockton. Its proximity to Interstate 5, CA-99, and the California Aqueduct have led to phenomenal growth in some towns by commuters from the San Francisco Bay Area searching for affordable housing prices. Other communities are being bypassed by developers and remain small farming communities.

Several years ago the National Aeronautics and Space Administration (NASA) operated Naval Auxiliary Landing Field Crows Landing (KNRC) just outside the little town of Patterson for flight research. NASA would fly their experiments to NRC and would have the benefits of basically unlimited open air space rather than the confines of the densely populated area around Moffett Field in the S.F. Bay Area. NRC has since closed. Too bad: this is where I first got to see testing of what became the V-22 Osprey aircraft.

Sheriff

151.115 Interoperability
 155.370 Dispatch
 155.910 Downtown jail (Modesto)
 156.075 CALCORD
 156.030 Court Bailiffs
 158.730 Tactical
 158.865 Secondary
 453.050 Jail F1
 453.325 Jail F2
 453.950 Jail F3

Fire

151.010 Command 3
 151.115 Interoperability
 153.770 Dispatch
 153.890 County Fire F3
 153.905 Modesto F3
 154.190 Turlock Fire
 154.415 Modesto F4
 154.325 Oakdale Fire
 154.370 Modesto F2
 154.430 County Fire F2
 155.085 Command 4
 155.940 Modesto F1
 453.525 Control F1
 462.975 EMS Dispatch
 463.000 AMR Mednet

Misc.

150.905 AAA VHF Dispatch
 153.245 Tri-Valley Growers
 155.115 Animal Control dispatch
 452.575 AAA UHF Dispatch

City of Modesto

Modesto was originally a stop on the railroad connecting Sacramento to Los Angeles and was founded in 1870. Folklore says that the new town was to be named for financier William Ralston who funded many projects in early California. Ralston, however, declined the suggestion and a Spanish speaking railroad

continued on page 71

Ten Meter Beacon Band: Proof of Emerging Solar Cycle

Hams and shortwave listeners waiting for the steady rise of the new solar cycle find themselves as impatient as six year-old children waiting for the arrival of Christmas. Monitoring WWV for solar updates and checking out on-line sites that track the parameters of the cycle are all good ways to anticipate when HF signals will improve.

Proof of a steady rise in the cycle can be found on 10 meters, because when the solar cycle is in full swing 10 meters is one of the hottest places to be for DX. Monitoring the 10 meter beacons may give you an inside track on what's happening in the solar cycle.

I wrote an article for the May 2007 issue of *MT*, titled "Exploring the World of 10 Meter Beacons," which is available on the *MT* homepage (www.monitoringtimes.com/MT-10meters.pdf) and details this intriguing monitoring niche. This month's *Beginner's Corner* includes updates to the web links mentioned in that article and takes a look at one ham's very ambitious beacon project, including a Morse code (CW) beacon for CB channel 14 that's been in operation for nearly eight years.

❖ Clever Little Beacons

Ten Meter beacon listening is a great place



K6FRC/B main transmitter rack with auxiliary transmitter and power supply below. (Courtesy: Paul Shinn K6FRC)



K6FRC/B3 uses a VR-900 radio with a PicCon controller. (Courtesy: Paul Shinn K6FRC)

for beginners. You can tune in on nearly any portable radio that covers the 10 meter beacon band (28.200 - 28.300 MHz) and has side-band reception capability to be able to tune in the CW signals that these stations transmit. Most beacon stations send their ID messages at between 5 and 15 words per minute. It's a great way to practice your CW skills as each message is different and, unlike actual CW conversations (QSOs), the message is repeated until you get sick of hearing it. That lets you copy it over and over to fill in the blanks.



K6FRC/B1 is a rack-mounted RCI 2995DX with PicCon controller. (Courtesy: Paul Shinn K6FRC)

Most beacon stations are modest. Converted Citizens Band (CB) radios, commercially built low-power (QRP) rigs, and ultra-compact, home-brew transmitters make up the bulk of 10 meter beacons on the air. And, because most beacon stations operate using low power (as low as 20 mw), they take up very little space. This allows beacons to be placed nearly anywhere, even places that are very inconvenient, as you'll see below.

These stations also lend themselves to all manner of experiments in power supplies. While most use commercial power, some are operated with deep cycle batteries charged by solar panels. One station is powered directly from a solar panel so that when the sun goes down the beacon is off, which works out nicely because propagation disappears on 10 meters when the sun goes down as well.

Many beacon stations use vertical CB ground-plane antennas because they radiate evenly in all directions, they're cheap, readily available, and very easy to trim to the exact beacon frequency for lowest SWR. Other stations use horizontal dipoles cut to the frequency, and at least one beacon uses a sloper antenna.

❖ Extreme Beacon Project

Despite the simplicity of most 10 meter beacon operations, there is one exception of which I became aware when I received an e-mail from its operator, Paul Shinn K6FRC. Paul contacted me last fall after he read my beacon article on the *MT* web site. He is chief engineer for nine radio stations in California and a contract engineer to 17 others. He says, "I have no assistants, I'm a one-man show." That makes the rest of us seem like slackers.

28.250 MHz CW Beacon
Nearest City: Tracy, California

K6FRC/B

Lat: 37° 37' 32.00" N Lon: 121° 23' 58.00"

THANK YOU FOR YOUR RECEPTION REPORT

Confirming Reception of K6FRC/B with	Day MO YR	UTC	MHz	Report Received	Power	Antenna
			28.250		100 WATTS	PogoStick Vertical

K6FRC's main beacon QSL card. (Courtesy: Paul Shinn K6FRC)

Paul is also an avid shortwave listener (his main receiver is a tube-fired R-390A) and a ham (his transceiver is a Kenwood TS-440). He lives on top of a mountain with no nearby neighbors and, as he says, thanks to two miles of copper wires buried under his tower and lots of wire antennas, he has "zero noise and gobs of signals."

There is nothing typical about his beacon stations. Paul can operate four different K6FRC 10 meter beacons ranging in power from 10 to 100 watts. He also has a Part 15 beacon operating at 27.125 MHz (CB channel 14) with an output of 16 milliwatts that's been on the air 24/7 for nearly eight years.

Paul also built the beacon station for W6CF/B, the Jim Maxwell memorial ham station at the California Historical Radio Society museum. Paul writes, "It is Jim's actual ham shack donated by his widow. The museum keeps it as Jim had it, desk and all. I built the W6CF/B

beacon as a memorial to Jim and a way to keep his call on the air, even though he has passed on. He isn't your average SK [silent key]!"

Paul uses PicCon controllers to key the transmitters because he can remotely control the beacons. "I just connect a VHF or UHF receiver audio output to the PicCon and send DTMF tones to turn the beacon on or off, change the message, timing, etc. It's a comforting feeling to be able to control the beacon since most of my beacons take hours to reach."

As for antennas, Paul uses Shakespeare PogoSticks (no longer in production) on all of his beacons. He gets a lot of wind at his high altitude QTH and says of the PogoSticks, "Hands down, the best 10/11 meter antenna ever made for hilltop installations." He also notes that "I can switch between the two beacons via remote control using an HT or my base. The transmitters share the same antenna through an RF sensing switch, so only one can be on the air at a time, so it meets the FCC rule regarding [not having] more than one beacon on the air at the same time from the same site."

Though band conditions continue to lag, past performance has been good. Paul notes that, "There are many times that European spotters log K6FRC/B as the only U.S. beacon heard." When conditions are good, Paul reports that he receives as many as three QSL requests a week and his beacon has been heard as far away as China.

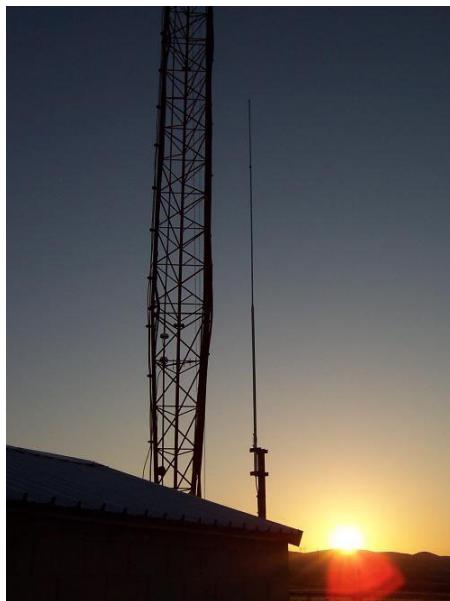
All beacon operators respond to QSL reports but their response policy varies. Some issue paper QSLs, others issue e-mail QSLs, most require an SASE. You can find the QSL policy of each by entering the beacon's call sign at www.qrz.com.

❖ Learn More about the World of Beacons

One of the best ways to learn more about 10 meter beacon operations is to subscribe to



Atop the tower at 2,500' is the K6FRC/B Shakespeare PogoStick 10 meter antenna. (Courtesy: Paul Shinn K6FRC)



Sunset at the K6FRC/B antenna site. (Courtesy: Paul Shinn K6FRC)

the "Beacon Reflector" which serves as a daily roundtable discussion about which beacons are being heard and where. Responders also give tips on troubleshooting existing beacon stations and savvy advice about how to get your own beacon on the air. The reflector list includes many beacon operators from around the world. To find out how to subscribe to the reflector go to www.explore.force9.co.uk/beacons/hfbacons.htm and follow the directions.

Another resource is "10 Meter World Wide Propagation Beacons," www.10mbeacons.com. This is a "real-time" spotter service similar to the DX cluster used to spot DX hams on the air. And, like the DX cluster, you can add your beacon spots on the page by clicking on the "add your spot" button. Beacon operators rely on reports from monitors to tell them how their beacon is operating and where it's being heard.

Monitoring the 10 meter beacon band is a serious test to see just how good your listening post really is. Beacon monitors reporting to the reflector sometimes note dozens of beacons heard at their location at a time when you perhaps have heard none. You can find out how they do it by monitoring the reflector. Many list their 10 meter monitoring equipment in the signature of their post.

If you're interested in putting your own beacon on the air, you should contact Bill Hays WJ5O, the International Amateur Radio Union (IARU) designated beacon coordinator for IARU Region 2. Bill has had his own beacon up and running since 1992, putting out 2 watts into a vertical antenna at 28.289 MHz.

But before you think about putting your own beacon station on the air, monitor the band and learn all you can about the existing stations. Study the latest WJ5O 10 meter beacon list (kept up-to-date almost daily and available at his home page noted below) to determine where on the band you should locate your beacon. You have to be a "considerate beacon band operator" by not locating your signal too close to the frequencies of other beacons in your area or too



CW on CB? Yes! Paul Shinn's K6FRC 11 meter Part 15 beacon operating at 16 mW into an Antron99 vertical antenna near Mt. Diablo, Northern California. Paul says it's been heard in almost all states and several continents since April 1, 2001. (Courtesy: Paul Shinn K6FRC)

close to the frequencies of DX beacon operators.

And, even though the FCC allows beacon output as high as 100 watts, be aware that the vast majority of ten meter beacons put out less than 10 watts. The less power used by all, the more beacons can squeeze onto the band. Study the rules regarding beacon operation in the FCC Rule Book (§97.203).

I noticed in the latest beacon list, as this is written, that there are quite a few "uncoordinated" beacons in operation compared to two years ago. These operators probably aren't aware that the purpose of coordinating their beacon frequency is to avoid interference on the band and to make sure operators understand the general guidelines for beacon operation. To get your beacon station "coordinated," e-mail Bill Hays at wj5o@amsat.org. You can learn more at Bill's beacon page here: <http://userpages.troycable.net/~wj5o>. He has provided links to virtually everything that's worth knowing about 10 meter beacon operations, including how to convert a CB radio to beacon band operation.

U.S. hams are limited to 100 kHz from 28.2 to 28.3 MHz for beacon operation, but the rest of the world also uses frequencies down to 28.100 MHz. Dozens of international beacons can be heard on those frequencies from Canada to Lebanon and French Guiana to Bologna, Italy.

Listen also to 28.200 for the NCDXF/IARU International Beacon Network, which operates a system of 17 beacons worldwide. Each station sends a transmission every three minutes, consisting of the call sign sent at 22 wpm followed by four 1 second dashes, sent at 100 watts power to start and then 10 watts, 1 watt, and finally, one tenth of a watt. Now, that's a great test of band conditions and your listening post! If you can copy any beacons, the band is open.

K6FRC's 10 Meter Beacon List (each beacon, when turned on will ID as described):

K6FRC/B (28.250 MHz 100 watts)
K6FRC/B2 (28.300 MHz 10 watts)
K6FRC/B3 (28.275 MHz 10 watts)
K6FRC/B4 (28.225 MHz 10 watts)
K6FRC (Part 15- 27.125 MHz 0.016 watts)
W6CF/B (28.2045 MHz)

Full details on K6FRC's beacon operations are found at www.k6frc.com.

Los Sonidos de Bolivia!

The sun rises over the peaks of the Andes as the soft sounds of panflutes drift through the thin mountain air. If you listen closely, you can hear the voices of the Quechua and the Aymarians sing songs of family and ancient days, long past.

Perhaps more than any other South American country, Bolivia continues to embrace the rich and diverse cultural origins of its native people. For the radio listener, this provides a fascinating glimpse into the past with each note that drifts through their speakers. From La Paz to Puerto Aguirre, Bolivia is singing its history for all of those who are willing to listen.

Those searching for traditional programming content from Bolivia often had to rely on the unpredictable and elusive signals emanating from the shortwave tropical bands. For those with luck or the right latitude, it may even be possible to tune in to locally targeted mediumwave stations. But for the masses, Bolivia has remained an elusive target from which to gleam its cultural treasures – until Internet radio, that is.

While there isn't a large number of terrestrial stations streaming their signals online, Bolivia does have quite a few Internet-only broadcasts to add to the number of choices available to listeners. My personal favorite is **Radio AG Bolivia**. The station is run by an organization called Group AG Bolivia, whose goal is to spread the culture of Bolivia, especially its music, to the rest of the world. Content that can be found on Radio AG is mainly of traditional



Bolivian and Andean panflute style music, although the occasional Argentine tango or other Latin (almost Tejeano) style music can also be heard through Radio AG.



There also are sometimes spoken word programs on Radio AG, but all are in Spanish or native languages. On the Radio AG Web site, the group mentions that they are working to restore Bolivia's Pacific coastline (seceded to Chile in 1884 after the War of the Pacific and the target of renewed efforts recently to be returned to Bolivia), so one can guess what some of the spoken word content on Radio AG may be about!

Those of you who DX the shortwave tropical bands may be familiar with **Radio Panamericana Bolivia**. Radio Panamericana is a network of FM and AM stations in Bolivia that also broadcast on shortwave at 6105 kHz. Content usually features "Latin hits," an eclectic mix of pop-infused, high energy Latino music. Radio Panamericana also broadcasts news and events and has stations scattered throughout the country, including major cities such as La Paz and Cochabamba, among others.

Other national networks in Bolivia also are online including **Radio**

Patria Nueva, a state-run community network that broadcasts on FM, AM and shortwave (as Radio Illimani); **Radio Fides** (with news through BBC Mundo) which includes the popular **Radio Laser 98** and several locally targeted Radio Fides stations in various Bolivian cities, as well as Catholic programming.

Some of the stations that are streamed online from Bolivia are hit-or-miss as far as reliability, and almost all broadcast in Spanish only, so there can be a few barriers for some listeners. But for those looking for a glimpse into the lives of those who live in the heart of the Andes, Bolivian Internet stations provide a rare peek into this fascinating and beautiful country's culture.

❖ The Sangean WFR-1

Recently, I was given as a gift a Sangean WFR-1 Internet radio and I have been absolutely blown away by its performance.

First, the unit is stunningly beautiful. It is enclosed in a rich, walnut cabinet shined to a high gloss finish. It has a simple and minimalistic number of buttons on the radio front (which I always prefer to a highly cluttered layout). The amber display is flanked by two speakers which are at the heart of why I love the WFR-1 so much.

Not all Internet radios are created equal, and the WFR-1 certainly is proof of that. While many might take you to the same stations, the good ones separate themselves from the pack with truly magnificent audio. The WFR-1's audio is second to none, providing rich and deep lows, without making things too muddy. It is easy to fill most rooms with audio without having to turn the volume wide open. I have found that with a good quality stream, it is possible to get near FM quality.

Setting up the WFR-1 is pretty much effortless for those with a basic knowledge of the logistics of Internet radio. If you



have an encrypted wireless connection, you will have to enter your key the first time you use the radio. If you prefer a hardwire connection, the WFR-1 has an Ethernet port on the back.

Rather than an internal antenna, the WFR-1 has a separate wireless antenna in the back (similar to those found on most wireless routers), boosting the wireless range of the WFR-1. The WFR-1 has been tested at the Van Horn household and at my apartment and it has received wireless signals very reliably through a wireless-G router.

The WFR-1 also has a telescoping FM antenna in the back to pull in local FM-RDS signals. Other source options include a jack in the back to plug in an iPod or other media source, and for streaming audio files from your Windows-based computer through file sharing. Setting up file sharing with the WFR-1 is a breeze and the instructions in the included manual are very thorough and helpful.

Navigating the WFR-1's menu set is highly intuitive. The included remote control (using two AAA batteries) allows you to change settings without having to hover over the unit. This should also help to keep fingerprints off of the cabinet. Stations are easily found by location, genre, or through a simple search.

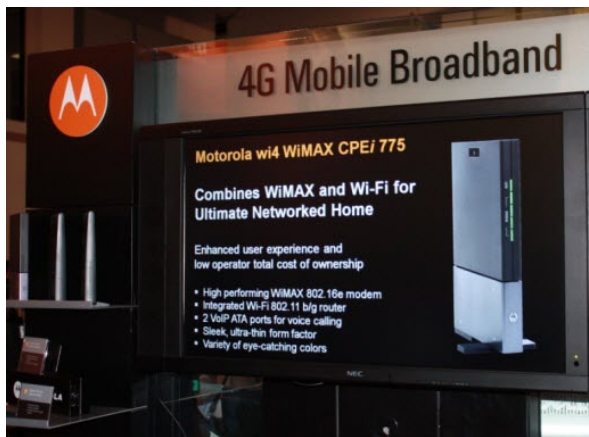
The WFR-1 enables users to store 10 preset stations and an unlimited number of "favorites." The presets are easily set through buttons on the remote control, while the favorites are selected from an online list and sent to the user's radio.

When not in use, the WFR-1 displays an Internet controlled clock and has alarm functions for those placing the WFR-1 at their bedside. But to be honest, the WFR-1 is meant to be in a living room or other social room of the house where its beauty and quality can be fully admired. If what you need is an alarm clock that receives Internet radio, there are several lower cost alternatives with lower quality audio that should suffice. But if you are looking for a high quality unit that delivers room filling audio from around the world, look no further than the WFR-1.

The Sangean WFR-1 can be purchased from Grove Enterprises online. A link can be found in the Web link table at the end of this article.

❖ Truly "Wide-area" Networks?

Undoubtedly, many of you have heard of the coming WiMax revolution. For the uninitiated, WiMax is the imminent replacement or at least an alternative wireless Internet broadcast standard. Companies such as Sprint, Intel and Google are putting



large amounts of funding towards making WiMax a successful venture. There are a few cities that have already had preliminary WiMax rollouts and there has been much debate about using some of the unused analog TV spectrum for WiMax use once the U.S. completes its digital television conversion.

What does it mean for the Internet radio listener? We could be inching closer to truly mobile and portable Internet radio technology. Most of what is on the market now is restricted to WiFi hotspots or mobile phone services. WiMax has the potential to open Internet radio up to in-car audio systems and other personal mobile devices such as mp3 players.

There are a few problems, including some reported interference with C-band satellite signals. But once the kinks are worked out, WiMax sounds like it could be an exciting new step to a truly wide-area wireless network solution, opening up a whole new set of possibilities for mobile Internet applications, including Internet broadcasting. Of course, I will bring you updates on advancements with WiMax as they come right here in my column.

Until next month, 73, Loyd.

WEB LINKS

Radio AG Bolivia - www.agbolivia.org/

Radio Petria Nueva - <http://abi.bo/index.php?i=patria-nueva&j=patria-nueva/indice.html>

Radio Fides - www.radiofides.com/audioradio.asp

Panamericana Bolivia - www.panamericana-bolivia.com/

Bolivian stations at Reciva.com - https://www.reciva.com/index.php?option=com_cloud&action=search&type=freetext&searchBar=bolivia&page=1&sortBy=name&resultsPerPage=20# (Note for our print readers: you can also just search for "Bolivia" in the search field at the reciva.com home page.)

Sangean WFR-1 from Grove Enterprises - www.grove-ent.com/wfr1.html

WiMax - www.wimax.com/

Sangean WiFi Radios

Now you can enjoy the excitement of accessing over 16000 Internet Radio Stations almost anywhere when you own a new Sangean WFR-1 Internet Radio and in addition enjoy any of your local standard FM broadcasts using the built in FM tuner with RDS or upload your favorite or any internet station to your Sangean WFR-1's "My Station" allowing quick and easy future access. You no longer need to be glued to your computer to access your favorite Internet station nor do you even have to have your computer on. All you need is a broadband internet connection and a wired or wireless router. Add to your listening pleasure by creating your own Digital Music Library. The Sangean WFR-1 offers the ultimate in Internet Radio listening.

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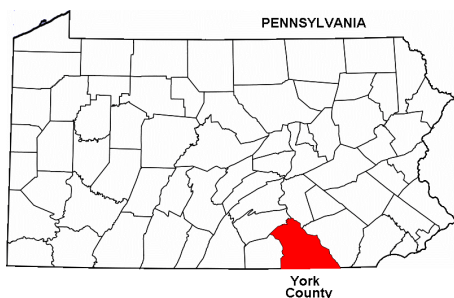


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"Unacceptable" for Public Safety Use

When the soothsayer in Shakespeare's *Julius Caesar* warned, "Beware the ides of March," he was referring to a future tragic event that might have been avoided had proper precautions been taken. In a modern context, such a warning could be equally applied to the design and maintenance of complex radio networks. This month we take a closer look at three troubled radio systems and close with some tips to help keep your eyes skyward.

❖ York County, Pennsylvania



In the December column we discussed the new Project 25 trunked radio network for York County, Pennsylvania, located in the south-central part of the state bordering the Mason-Dixon Line. The county of 380,000 residents committed to a \$68 million technology upgrade including a new building, a new computer-aided dispatch (CAD) package, new antenna towers, and new radio equipment in repeater sites and in the hands of public safety personnel.

The purchase and installation of radio equipment alone was priced at \$36 million and included 131 base stations, 1,021 vehicle-mounted mobile radios and 2,857 portables. In 2005 the County requested bids and eventually selected M/A-COM Wireless, a division of Tyco Electronics, over perennial competitor Motorola to be the equipment supplier.

The old system had nine VHF channels, which were often all in use during busy periods. Officers often had to wait to report their status and location, request backup, and get information from a dispatcher. In contrast, the new system has nearly 50 active channels and promises to relieve those old radio bottlenecks.

However, with current openings for half a dozen full-time and more than a dozen part-time dispatchers, officers may be speaking with tired dispatchers working 12-hour shifts and mandatory overtime.

The new system provides better coverage, including inside building basements and elevator shafts. Where fire personnel estimated the old system adequately covered somewhat less than 70 percent of the county, testing performed last year convinced them that coverage with the new system is better than 95 percent.

Most police departments in the county switched to the digital system in November -- a process called *cutover* that involves replacing radios and activating new programming.

Problems soon emerged, although M/A-COM describes them as "typical" and describes a three-step process of problem resolution. This first step is proper identification of the problem, where engineers try to understand the underlying mechanism of failure. The second step is duplicating the problem in a controlled environment, such as a test laboratory, where the problem behavior can be examined in detail. After that, a solution has to be worked out with county officials to field a fix.

Hand-Off

The most worrisome problems involve lost or garbled transmissions, which seem to occur during a behind-the-scenes technical process called *hand-off*. When a radio begins transmitting, it is typically communicating with the nearest repeater site, because as far as the radio is concerned, that site has the strongest signal and therefore is probably in the best position to receive a transmission. However, if that radio is moving during the transmission and happens to get to a location where the repeater site can no longer receive the transmission effectively, the radio must switch to another repeater site that is better able to hear it. This process of switching from one repeater site to another is called *hand-off* and is fundamental to cellular telephone networks.

Unfortunately, everything has to go smoothly in order for a hand-off to be successful. The original repeater site must correctly measure the signal strength of the incoming radio signal. If that signal strength falls below a certain threshold, the repeater site must inform the network controller of the situation. The controller, in turn, must identify a new repeater site that can better serve the radio and allocate a radio channel for it on that new repeater. The controller must then instruct the radio, via the

old repeater site, to switch over to the new frequency on the new repeater.

As you might imagine, many things could go wrong. The threshold setting could be set incorrectly. The local topography may cause the radio's transmission signal strength to fall too far too fast, making it impossible for any repeater to serve the radio. The controller may take too long or be unable to locate an appropriate repeater site, or other users may already occupy all of the radio channels on the best repeater site. If any of these events occur, the transmission will be lost.

Conversely, if the signal strength of the radio is too high, the network may have difficulty determining the appropriate repeater site and again drop or delay the transmission.

Because the voice transmissions are in digital form, lower received signal strength means more bit errors -- in essence, it becomes more difficult for the receiver to determine whether the transmitter sent a '1' or a '0'. Although these digital transmissions include a technique called *forward error correction* (FEC) that the receiver can use to help fix these bit errors, if the errors are too severe the FEC cannot fix them all and either the voice traffic is lost or it comes out garbled.

Equipment Problems

Besides the glitches with any new electronic device, York County personnel have reported problems with the rechargeable batteries in the portable radios. It seems that the batteries do not provide enough power for an entire shift, leaving the user to either swap battery packs or find a way to recharge it from the vehicle.

Network and system changes have also created a logistical issue, since many of the fixes have required radio re-programming. Getting all of the radios in from the field and properly upgraded imposes delays and a higher workload on public safety personnel and support staff.

M/A-COM has supplied technicians and computer programmers to the county in order to address the problems, and have a daily telephone conference with officials to keep track of progress.

Despite this effort and the positive testing from last summer, in December the county asked M/A-COM to prepare a plan for reverting back to the old radio system while major problems were addressed. Apparently the cutover has not been progressing as well as everyone had hoped.



Although installation of new radios into police cruisers was halted in anticipation of switching back to the old system, reverting is expected to be a temporary measure. While this gets worked out, some departments already have alternatives. For instance, Newberry Township officers have carried Nextel phones for several years as a backup and will continue to use them as necessary.

The original cutover plan called for the old and new systems to operate simultaneously for as long as it took for the new system to prove fully operational. Unfortunately, some users have reported that the old and new radios interfere with each other, adding to the confusion.

York County Digital System

The new county system is digital and follows APCO (Association of Public Safety Communications Officers) Project 25 standards, so any recent digital scanner that can trunk in the 500 MHz range is able to follow the activity.

The new system operates from 22 repeater sites around the county. The sites are organized into four sub-systems that transmit simultaneously (*simulcast*) and a fifth single site.

The Central System has 14 radio channels and operates from 9 repeater sites at the following locations: the Emergency Service Center on Pleasant Acres Road, the Judicial Center in York City, Queen Street, Manchester Township, Pleasureville, Red Lion, a long-term backup facility at the West Manchester Township Complex, the Wrightsville Water Tank and the East Manchester Water Tank

The North System has 10 channels and 4 sites at Dillsburg, Ramsey Hill, Reesers Summit, and Yocumtown.

The South System has 10 channels and 6 sites at the East Hopewell Township Complex, Gatchelville, Glen Rock, Shrewsbury, and the Stewartstown Water Tank

The West System also has 10 channels at 2 sites located at Iron Ridge and Spring Grove.

The stand-alone Fulton System has 3 channels and is at Peach Bottom in Lancaster County.

Because there were so few available frequencies in the 800 MHz band in south-central Pennsylvania, the radio frequencies assigned to the new York County system are in the UHF T-band and are normally part of television channel 19.

Central:

500.3125, 500.3625, 500.5625, 500.6125, 500.7875, 500.8625, 501.0375, 501.1125, 501.2875, 501.3625, 501.5375, 501.6375, 501.7625 and 501.8875 MHz

North:

500.4875, 500.5375, 500.8125, 500.9125, 501.0625, 501.3125, 501.3375, 501.5625, 501.5875 and 501.8125 MHz

South:

500.3375, 500.4625, 500.5875, 500.7375, 500.8875, 500.9875, 501.1875, 501.2625, 501.4375 and 501.4875 MHz

West:

500.6375, 500.6875, 500.9375, 501.0875, 501.3875, 501.4625, 501.7375, 501.7875, 501.9375 and 502.0375 MHz

Fulton:

502.0125, 502.3625 and 502.5375 MHz

The new trunked system is also "patched" to transmit and receive voice traffic on the following law enforcement frequencies. This allows officers with old radios to interoperate with the new equipment.

Freq	Talkgroup	Description
156.570	12100	City Police
156.330	12104	City Car-to-car
155.250	12110	County Police (North)
155.415	12120	County Police (West)
155.625	12115	County Police (East)
158.940	12105	County Police (Metro)
460.425	12130	County Police (Sheriff)

Fire Paging should still be heard on 33.90 MHz while the county works out the paging infrastructure and processes for all of the fire departments in the county. Reportedly, County Fire companies are still using 33.88 MHz to contact dispatch and may continue to do so until the new radio system is up and running.

Web Resources

The official York County Department of Emergency Services (DES) web site can be found at www.ycdes.org According to the site, DES provides dispatch services for 18 Police Departments, 7 Paramedic Units, 33 ambulance companies, 61 fire departments, along with various other local and state agencies. Each day they handle more than 1,200 calls for service.

You can see a list of active incidents from the computer-aided dispatch software at www.ycdes.org/webcad

The web page shows fire and traffic accident calls and automatically refreshes every two minutes. If you'd like to hear radio traffic from those incidents, there are live scanner feeds from York County at www.ycdesonline.com with links to county police and fire activity.

❖ New York Statewide Wireless Network

As you may recall from previous columns, in 2005 the State of New York awarded a \$2.1 billion contract to M/A-COM for a statewide public safety radio system. This system was to be based on M/A-COM's proprietary OpenSky technology, which was in direct competition with the public and far more common APCO Project 25 digital standards.

The first phase of the build-out plan for the Statewide Wireless Network (SWN) was in the western part of the state, covering the City of Buffalo and the Counties of Erie and Chautauqua. Initial testing in 2007 showed significant problems with the new OpenSky equipment and installations, including gaps in coverage and poor voice quality.

At the time, the State and M/A-COM pledged to work together on a remediation plan to correct the problems identified during testing.

Further work ensued, and after M/A-COM indicated they were ready, another round of testing took place in July 2008. Based on the poor results from those tests, described as



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“unsatisfactory and unacceptable,” in August 2008 the State informed M/A-COM that they were in default on the contract and had 45 days to fix problems in 19 identified problem areas.

Yet another round of tests took place in November, after M/A-COM claimed it had addressed 12 of the 19 areas and indicated that the remaining seven were outside the scope of the contract. According to the State, testing showed that only four of the 19 deficiencies were actually addressed and an independent engineering firm confirmed those findings.

The nine-page November test report summary shows numerous problems, which M/A-COM did not correct, in each of the following areas: Equipment Failures; Uninterrupted Roaming; Project Delays; Conformance Testing Failures; Quality Assurance; Vehicular Repeaters; Emergency Calls; Data Throughput; System Access Time; Network Reliability; Full Duplex Mode; Tower Hazard-Light Monitoring; Gateways; Caller Alias and Over-the-Air Provisioning.

In December the State announced that it was terminating the entire \$2.1 billion contract, calling the existing installation “unacceptable for public safety use.” The State also claimed it had already spent more than \$54 million on SWN and demanded reimbursement from M/A-COM.

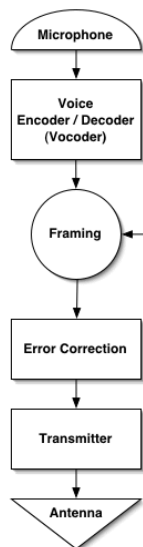
In response, M/A-COM announced that it “has fulfilled its contractual obligations” and would “take all necessary steps to protect the company’s rights under the contract.” They also hinted that the State had changed its mind about wanting such an expensive network, especially given the looming budget shortfall.

Although this one looks like it’s headed toward resolution (of sorts) in the legal system, the residents of New York remain without a comprehensive public safety radio network.

❖ Cleveland, Ohio

The City of Cleveland, Ohio, located on the shores of Lake Erie, began to suffer significant and repeated failures of their 15-year-old radio system at the end of 2008. Dispatchers and officers had to fall back on telephones and mobile

Digital Voice Transmission



computer terminals to communicate with each other. City workers from every department, including police, fire and paramedics were affected.

The eight-site trunked radio system was purchased from Motorola with a now-outdated form of digital voice capability called VSELP (Vector Sum Excited Linear Prediction), which encodes and decodes speech sounds differently than other digital methods. APCO Project 25, for instance, uses a method

called IMBE (Improved Multi-Band Excitation) that is incompatible with VSELP.

Motorola never made the details of VSELP available in the same way IMBE is available (i.e., via license from the owner, Digital Voice Systems Inc.), and equipment capable of using VSELP was only ever available from Motorola. Unfortunately for Cleveland, VSELP is no longer officially supported, having been retired several years ago in favor of newer and more efficient technology. Spare parts and replacement equipment is more difficult to come by, despite the more than \$3 million Cleveland paid to Motorola for radio system maintenance over the past eight years.

Scanner listeners are unable to monitor activity on the Cleveland system due to a simple lack of VSELP-capable scanners. Both the small VSELP market share and the difficulty of dealing with Motorola were apparently enough to keep scanner manufacturers from incorporating VSELP into their product lineup. For now, folks with Internet access can hear Cleveland public safety radio traffic via a feed at www.cleveland.com/policescanner/

Rumor has it that the relative privacy of VSELP was a selling point for the current Cleveland system. Apparently the mayor at the time attempted to cover up a minor incident but was discovered by a citizen listening to the previous police radio system. To prevent such “leaks” in the future, the mayor opted for the “protection” of VSELP.

Cleveland has announced they will begin looking for a new system soon, although given the current city finances it is not clear where the estimated \$30 million needed will come from.

❖ International Space Station

Dan,

I copied the following: “Houston; Alpha on VHF... Houston; Alpha on VHF... “ repeated continuously live by an American female on 143.625 MHz at 1:50 PM local (1850 Zulu) on December 19, 2008. This is the old Russian MIR frequency and I’m sure it was being used by the ISS going over.

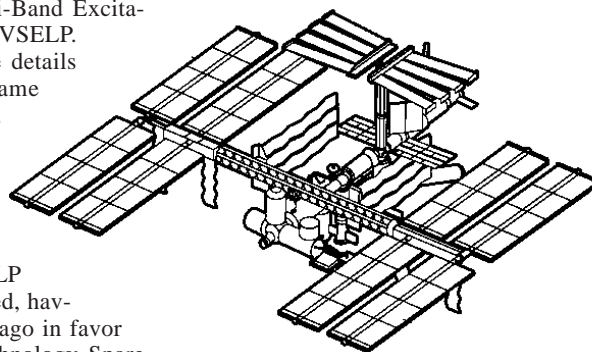
FYI, I live at coordinates about 43.5 North, 83.5 West, in Michigan.

The transmissions went beyond the usual three to four minute visual time of an overflight. I never heard her respond to any answer Houston might have acknowledged.

Hope you can use it; keep up the good work!

Don in Michigan

The International Space Station (ISS) is often heard in Europe communicating with Moscow flight Control on 143.625 MHz. You can also hear it over the United States with something as simple as a scanner and a decent antenna. You may also hear activity on 143.800 MHz.



These frequencies are just below the two-meter amateur radio band (144 to 148 MHz) and are officially allocated to various government and military activities. Most scanners manufactured in the past 20 years, and many before that, are able to tune to these frequencies. A decent antenna will also help, even if it’s just a telescoping whip, although an outdoor antenna will typically have much better performance than using a stock “rubber duckie” antenna indoors.

Once you have the proper equipment, the next challenge is figuring out when you might be able to hear the ISS. It is in low earth orbit, 250 miles above the Earth, with an inclined orbit that brings it over 85 percent of the Earth’s surface and 95 percent of the planet’s population. Chances are it will be visible to you many times each week.

The station is moving at about 17,000 miles per hour and completes an orbit of the earth in about 91 minutes. Typically the ISS will be above your local horizon for only a few minutes at a time, so your listening times will have to be planned well.

The National Aeronautics and Space Administration (NASA) maintains a Human Space Flight Realtime Data web page at <http://spaceflight1.nasa.gov/realdata/sightings/> where you can find sighting information for the International Space Station. After entering your location, the website will provide the date, time and position of the station for the next week or so, along with the duration of the sighting and the maximum elevation the station will achieve.

The website www.heavens-above.com can also provide sighting information. After setting your location, the site can provide date, time, location and altitude information for the next ten days. You can also find orbit and sighting information for other objects in the sky, including Iridium satellites and expended booster rockets.

By using this sighting information you can plan your listening sessions for the periods when the ISS is above your local horizon.

More information and links related to scanning and radio equipment are available on my website at www.signalharbor.com, and I welcome your electronic mail to danveeneman@monitoringtimes.com. As always, I’d love to hear about the systems and spacecraft you’re listening to, whether they have problems or are working just fine. Until next month, happy monitoring!

Q. *For energy conservation, I'm planning to re-bulb my lighting fixtures with compact fluorescent lamps (CFLs). I know they are much more efficient than standard incandescent bulbs, but how do I calculate which bulbs to buy to replace the old wattage bulbs?*

A. It's actually much simpler now than when the CFL bulbs first came out. They state both the equivalent power requirement of the old incandescent and the actual power requirement of the CFL -- it's nearly 4:1. For example, the 20 watt CFLs are equivalent to 75 watt incandescent bulbs.

Shop around and buy in quantity; I found the best deal in my town at Wal-Mart for a carton of 8. I've refitted our entire home with those budget packs!

Q. *Why should we have to ground a receiver or transceiver when the plug to the unit already has a ground in the third prong of the plug? (Manny Perry, KM6B)*

A. The third-wire ground on modern electrical appliances is a shock preventive only. With the random lengths of line cords and household electrical wiring, any impedance match between the radio and an earth ground at radio frequencies would be highly unlikely at worst, and accidental at best.

We can think of an RF ground as part of the antenna system, requiring a low standing-wave ratio (SWR) to effectively couple the radio ground to the earth. House wiring just doesn't do it. At some frequencies, the random wire might just be the correct multiple wavelength to be a resonant counterpoise ("missing" part of the antenna system) for an effective impedance match, but that's pretty iffy!

Q. *I have an electronic bathroom scale that gives VERY different readings depending on how I position my feet. I presume that it has something to do with the load cell. Are conventional scales a better choice? (Mark Burns, Terre Haute, IN)*

A. Judy, my wife, who is our household's officer in charge of bathroom scales, says that's easy -- just stand where you get the lowest reading! But here are some more realistic ideas.

When I buy a thermometer, I first look at the most expensive (accurate) models to see what their average (real) temperature reading is, then I buy the cheapest model that reads the same!

You might try that with weight scales as well. Try positioning your feet comfortably and uniformly on an accurate, expensive scale, then see if you can find a cheap model with the same reading when you uniformly place your feet.

A corollary to that would be to see what position is most stable on your present model, then go to the store and see what your real weight is on an expensive, accurate scale. You should be able to adjust your present scale to that reading. Just be sure to stand in the same spot for taking your weight readings. You might even want to put dots or lines of White Out or similar paint to position your feet correctly.

The most accurate consumer bathroom scales are the beam balances like they use in the doctor's office, not spring or electronic balances, unless they are adjusted over time to correct for aging of the spring mechanism.

Q. *Back in the 1960s, someone showed me how to convert the common "All-American 5" (five-tube AM broadcast receiver) to receive shortwave broadcasts by shorting out the loop antenna with about six to nine feet of wire. The strong local stations would still be heard at their normal dial positions, though weaker, but superimposed on the AM broadcast were shortwave signals. I once ascertained that I was getting from about 6 to 11 MHz shortwave signals with this setup.*

I would receive strong shortwave broadcasters like the BBC, Radio Deutsche Welle, Radio Moscow, and Radio Prague. Why did this trick work? (A. Joseph Ross, J.D., Boston, MA)

A. Shorting out the larger-inductance coil with a shorter piece of wire resulted in a smaller inductance which resonated at a higher frequency. The oscillator generates not just one fundamental frequency, but several harmonic multiples (overtones) of that frequency as well.

The oscillator frequencies and the incoming signal frequencies combine in the mixer stage, producing quite a number of sum and difference frequencies which are sorted out by the successive intermediate frequency (IF) stages.

The combination of your oscillator harmon-

ics and the now-higher-frequency loop antenna emphasized the higher shortwave frequencies, although the lower-frequency, strong AM locals still came through. My guess is that you heard the shortwave stations best at night when European 6-11 MHz propagation would be strong.

Not all AM radios, however, can be tricked that way. Those with a separate RF amplifier stage isolate the mixer from the loop, and changing the loop's characteristics would simply deny the mixer of a signal to convert.

Q. *In the April MT you said no scanner made can decode a digital cellular signal. In that same issue is an ad for the AOR SR2000A receiver with a cellular-blocked civilian version, but a full-coverage government version as well. Can this unit can decode cellular digital signals? Is an older scanner that covers the cell phone frequencies now illegal to own? (Rick Helmke, KI4WUB, Auburn, AL)*

A. Cell phones are now all digital, so no scanner can decode the conversations (even those which can receive signals in that range). The laws forbidding cell phone reception were effected while signals were still analog and could be easily monitored.

Any scanner which was originally FCC approved is legal to own, even those made before the anti-cellular-reception laws.

Q. *With the glut of old rooftop TV antennas available, can these piles of scrap be rolled over 90 degrees so they are vertically polarized and used as beam antennas for scanner reception? (Anthony Johnson, email)*

A. Absolutely. The legend Grove Scanner Beam is based on just such a TV antenna design. For scanner use, however, our manufacturer has the elements cut slightly different in length and spacing to favor the land mobile bands, but just as it is, a TV antenna does a good job.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)

Will There EVER Be Sunspots Again?

Where, oh where, is Solar Cycle 24?

Anyone who keeps track of solar-terrestrial data for the purposes of understanding radio signal propagation knows what's up. To be exact, they know what's NOT up. What's not up, when it is supposed to be, is the Smoothed Sunspot Number (SSN). This means that geomagnetic and ionospheric activity also remain in their own kind of depression. They're in an extended sulk that no one can explain. They are supposed to come out and play, but they stubbornly refuse.

The real effects of Cycle 24 on radio signals were already overdue in December of 2007. That's when some tiny magnetic phenomena appeared in the "right" place, and the new cycle could be considered underway. We were assured that the fun had started. Only problem was that it hadn't.

Soon enough, the experts realized that they were in completely uncharted territory. They were split between two predictions for the new cycle. One of these forecast a nearly vertical rise in 2008, to a vigorous peak SSN around 140. The other called for a more gradual rise, peaking at a wimpy 85 or so. All they could agree on was that March of 2008 would decide whose prediction would become "official."

March of '08 came and went. It decided something, all right. Both predictions turned out to be wrong. Nothing happened at all.

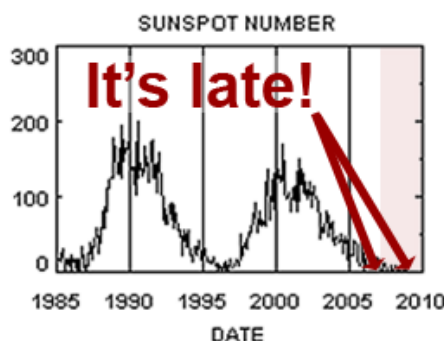
That was last year. Now it's 2009, and solar activity has reached absolutely historic lows. It's becoming unsettling. What, if anything, is wrong with the sun?

What's become really alarming is geomagnetic activity. We like it to be low, but not this low. One measurement, the planetary A index (Ap), has literally fallen off the bottom of the scale. It's not only the lowest ever, but it's lower than anyone thought it could go. The solar "dynamo," as they call it, seems to be in an extended quiet state.

A few extreme theories, which are not by any means a consensus, are proposing another

"Dalton Minimum." This name refers to a period in the early 19th Century, in which the solar cycle seemed to skip a beat, leading to an abnormally long minimum followed by three very low peaks. Supposedly, this seeming anomaly combined with unrelated volcanic eruptions to cause disastrously cold summers and major crop failures. It's fortunate that no one was on the radio to endure the equally frigid propagation.

Meanwhile, we can at least take some minor comfort in the fact that expert predictions have started to converge. Agreement seems to be building around a US government forecast for a delayed, rapid rise sometime around the end of 2009. This is projected, from statistics on other cycles, to reach a respectable but not spectacular peak SSN of 100 in 2012.



If they've finally gotten it right, the bad news would be almost another year of truly putrid band conditions. At this point, though, the good news would be that 100 is certainly more than enough to get the ionosphere going a whole lot better than it has been lately.

Personally, I have gotten to where I'll take anything. Beggars can't be choosers.

❖ Software Defined Radios

Last month, we very briefly mentioned that the real cutting edge of experimental radio technology was the Software Defined Radio (SDR). The military is throwing big bucks at this concept, but hams are also making innovations here on shoestring budgets.

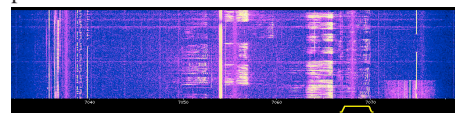
The basic SDR concept is an attractive one. It's basically programming a computer to receive and/or transmit radio signals. Extremely simple radio-frequency (RF) circuitry interfaces through analog-digital conversion to a computer, using the sound card or Universal Serial Bus (USB) cabling. The computer does the processing once reserved for fancy receiver hardware, at a huge gain in flexibility and ability to experiment with

new techniques.

We've mentioned how digital signals are becoming common in utility radio. This means that most of one's radio time is spent at the computer anyway. It makes a certain sense to put the radio in the computer. It's certainly a good use for that old machine you've been meaning to take to the e-waste center.

While hams often homebrew their SDRs, commercial units are available. These cost about as much as the self-contained short wave radios we're used to. In other words, the low end is a couple of hundred dollars US, and the high end is whatever you feel like spending. For this, you get some pretty amazing capabilities for band scanning and for saving whole huge chunks of spectrum to disk for later analysis by yourself or others.

What really interests me right now is the capability of some SDRs to send their received audio over the Internet. This has some obvious possibilities.

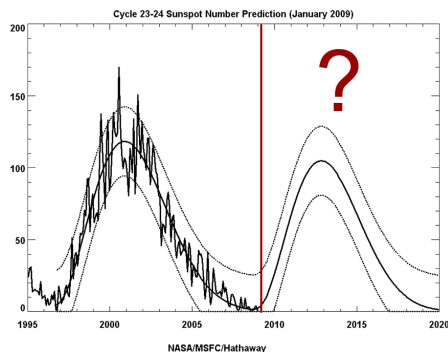


If you want to see the potential here, go to <http://websdr.ewi.utwente.nl:8901/>. This is a three-band ham SDR at the University of Twente, Enschede, Netherlands. Unlike other online radios, this one lets everyone select their own frequencies. It runs a small Java application on your computer, creating wide spectrum displays of digital band segments on 80, 40, and 20 meters. You tune by moving around these with the mouse, selecting audio that sounds just like the filters we're all used to.

By traditional standards, the RF performance is absolutely miserable. Nor is the antenna anything special. The sound, however, is great. Signals are strong and easy to decode. It's the most fun I've had with ham radio in quite some time.

Do check out the tech data and photos. It's astonishing how simple the RF circuits can be. In this case, they're hanging from their leads on copper ground planes. They're working into three separate sound cards installed in an old, off-the-shelf computer.

If you're in the United States, you might be surprised by how lively the 80 and 40 meter bands are "over there." Sure seems like they're having a lot more fun with digital ham modes than we are. As long as this kind of innovation is going on, I won't have to worry about the future of the radio hobby.



ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
ALE.....	Automatic Link Establishment
AM.....	Amplitude Modulation
ARQ.....	Automatic Repeat reQuest
ATU.....	Arab Telecommunication Union
ATU-80.....	Arabic teleprinting alphabet
AWACS.....	Airborne Warning And Control System
CAMSLANT.....	Communications Area Master Station, Atlantic
CAMSPAC.....	Communications Area Master Station, Pacific
COTHEN.....	Customs Over-The-Horizon Enforcement Network
CW.....	On-off keyed "Continuous Wave" Morse telegraphy
DHFCS.....	UK Defence High Frequency Communications Service
DSC.....	Digital Selective Calling
E10.....	Israeli Intelligence, female phonetic voice
E11.....	Russian Intelligence, "xxx Oblique 00," no message
EAM.....	Emergency Action Message
FAX.....	Radiofacsimile
FEMA.....	US Federal Emergency Management Agency
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communication System
LSB.....	Lower Sideband
M08a.....	Cuban 3-msg Morse, ANDUWRIGMT = 1-0
MARS.....	Military Affiliate Radio System
Meteo.....	Meteorological (weather office)
MFA.....	Ministry of Foreign Affairs
MSK.....	Minimum-Shift Keying
MX.....	Russian single-letter beacons & markers
NAVTEX.....	Navigational Telex
NORAD.....	North American Aerospace Defense Command
PSK.....	Phase Shift Keying
R3E.....	Single sideband, reduced carrier
RTTY.....	Radio Teletype
SHARES.....	Shared Resources, US federal frequency pool
SITOR-A.....	Simplex Telex Over Radio, mode A
SITOR-B.....	Simplex Telex Over Radio, mode B
Stanag.....	Standardization Agreement
Stanag 4285.....	Military single-tone 8-PSK data mode
UK.....	United Kingdom
Unid.....	Unidentified
US.....	United States
USAF.....	US Air Force
USCG.....	US Coast Guard
VOLMET.....	Formatted aviation weather broadcasts

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

288.5	670-Differential Global Positioning System beacon, Ireland, 100-baud MSK corrections at 2235. (Michel Lacroix-France)
499.3	"PAT"-Irish "Happy New Year" pirate beacon, sending "HNY PAT" in CW, at 2220. (DL8AAM-Germany)
518.0	"F"-UGE, Arkhangelsk Radio, Russia, SITOR-B NAVTEX bulletins at 0100. (MPJ-UK)
1704.0	OXZ-Lyngby Radio, Denmark, navigation warnings at 0543. (Ary Boender-Netherlands)
1785.0	LGZ-Rogaland Radio, Norway, navigation bulletin at 2001. (Lacroix-France)
2070.0	JPQ-Lithuanian Navy Headquarters, Klaipeda, calling JPNET in ALE, at 2049. (MPJ-UK)
2187.5	OUXG2-Danish cargo vessel Esvagt Kappa, DSC safety test with Aarhus/Bremen, at 0035. (MPJ-UK)
2446.0	TARANTO-Italian Financial Police, calling BOVIENZO (Coast Guard patrol boat), ALE at 2056. (MPJ-UK)
2493.5	T832AA-US Army or National Guard, ALE sounding at 0350. (Jack Metcalfe-KY)
2623.2	DRFA-German Navy mine hunter Datteln, working DHJ59, at 0650. (Lacroix-France)
2749.0	Sydney-Canadian Coast Guard, warnings in English and French, at 0757. (Patrice Privat-France)
2810.0	OFK-Turku Radio, Finland, Finnish bulletins, parallel on 1677, at 0653. (Lacroix-France)
2872.0	C-FBEF-Air Canada Boeing 767, working Shanwick at 0706. (Lacroix-France)
3151.0	PCD2-Israeli Intelligence phonetic alphabet station (E10), AM

3193.5	identifier only, at 1832. (Lacroix-France)
3193.5	DKB-Possible US Army, ALE sounding, also 3193.5, 5237.5, 7309.5, and 8050, at 2237. (Metcalfe-KY)
3255.0	Amba-Samara (Kurumotsh) Aero, Russia, radio check in Russian with Shpora (Rostov-na-Donu Aero), at 0253. (ALF-Germany)
3264.0	RMP-Russian Navy Baltic Fleet, Kaliningrad, CW weather at 1714. (MPJ-UK)
3310.0	ESA-Tallinn Radio, Estonia, bulletins in English and Estonian at 0635. (Lacroix-France)
3330.0	CHU-Canadian Institute for National Measurement Standards, R3E time beeps plus voice identifier in English and French, at 0721. (Boender-Netherlands) [Also note new frequency of 7850. -Hugh]
3455.0	Jet Blue 893-Flight getting primary 5520, secondary 6586 from New York Radio, at 2338. (Allan Stern-FL)
3485.0	New York Volmet-US Federal Aviation Agency, aviation weather observations at 2348. (Stern-FL)
3650.8	"V"-Russian Navy single-letter CW beacon (MX), Sevastopol, at 2226. (Boender-Netherlands)
3756.0	"The Pip"-Russian military CW channel marker, at 2228. (Boender-Netherlands)
3810.0	HD2IOA-Ecuador Navy, Guayaquil, LSB time signals and Spanish announcements, at 0506. (PPA-Netherlands)
3824.0	AAA-Israeli Air Force control, Tel Aviv, also on 3865, 5269, 6742, 6921 and 6992; ALE sounding at 0001. (MPJ-UK)
3828.9	"The Squeaky Wheel"-Russian military weird channel marker, slower than usual, at 2156. (Boender-Netherlands)
3840.0	YHF-Israeli Intelligence (E10), phonetic AM identifier and message in 5-letter groups, more repeated letters than usual, at 2201. (Mike-West Sussex, UK)
4032.9	AAA3VA-US Army MARS, LSB Region 3 net, at 1224. (Mark Cleary-SC)
4067.2	UZHMET-Tashkent Meteo, Uzbekistan, FAX weather charts at 0315. (DL8AAM-Germany)
4194.0	RAL48-Russian Navy warship, working RIT, Severomorsk, CW at 2029. (MPJ-UK)
4270.0	Unknown-E10, R3E 5-letter-group phonetic message being jammed, at 1646. (MPJ-UK)
4558.1	"A"-Russian Navy single-letter CW beacon (MX), possibly Astrakhan; first hit in a long time, also on 5154.1 and 7039.1; at 1612. (Boender-Netherlands)
4620.5	"The Buzzer"-Russian military AM channel marker, at 2121. (Boender-Netherlands)
4721.0	277171-USAF C-17A, ALE sounding at 2358. (Cleary-SC)
4934.1	TTD-Unknown 3-letter net, calling EST (US Customs Eastern Gateway), at 1608. (Cleary-SC)
5250.0	CSK-USCG, Kodiak, AK, calling CAMSPAC (USCG, Point Reyes, CA), ALE at 0231. (Cleary-SC)
5281.0	7TCA-Unknown Algerian station, working 7TOH in Arabic and French, at 0454. (ALF-Germany)
5343.0	RIT-Russian Navy Northern Fleet Headquarters, Severomorsk, calling RAL48 and RJQ84, CW at 0134. (ALF-Germany)
5550.0	Transat 498-Flight passing position to New York, then handed off to Miami Center on 132.2, at 2340. (Stern-FL)
5652.0	G-VYOU-Virgin Atlantic flight VS0200, an A340, HFDL position for Riverhead (NY), at 2252. (MPJ-UK)
5680.0	Kinloss Rescue, Scotland, working aircraft S169, at 1358. (MPJ-UK)
5690.0	ALN-Unknown 3-letter net, raised BRX in ALE, then secure voice, at 1610. (Metcalfe-KY)
5696.0	Swordfish 14-USCG, position for CAMSLANT at 0250. (Richard Dillman-CA)
5702.0	FWV-French Navy, Nimes, working L5S in French for RTTY setup on 5704, at 2130. (ALF-Germany)
5708.0	450028-USAF KC-10A tanker, calling GUA (Anderson HF-GCS, Guam), ALE at 2226. (Cleary-SC)
5732.0	Shark 01-USCG Cutter Bear (WMEC 901) radio check with Panther (US Drug Enforcement Administration, Bahamas), at 1541. (Cleary-SC)
5753.0	Unid-Russian military, CW flash-priority message to RLO, at 2151. (ALF-Germany)
5881.5	TKFMH-Possible USCG in ALE sounding, also using 5881.5, 6983.5, 6985, 9295, 10818, and 14483.5, at 2050. (Metcalfe-KY)
6230.0	VWV-Wiluna Meteo, Australia, forecast and warnings at 1710. (PPA-Netherlands)

- 6316.2 IDR-Italian Navy, Rome, Stanag 4285 marker at 0750. (PPA-Netherlands)
- 6340.5 NMF-USCG, Boston, FAX weather charts at 0816. (PPA-Netherlands)
- 6360.0 5JL9-Venezuelan Navy Frigate Mariscal Sucre, working T5L1 (Commander, Frigate Squadron), ALE at 0800. (Mdmmonitor-MD)
- 6384.0 GYA-UK Navy, Northwood, FAX weather charts at 2255. (DL8AAM-Germany)
- 6483.0 9MR-Royal Malaysian Navy, RTTY 5-letter-group messages to ships at 1906. (MPJ-UK)
- 6586.0 Jet Blue 703-Flight passing position to New York, then handed off to San Juan Center on 134.3, at 2321. (Stern-FL)
- 6628.0 Iberia 2707-Flight passing position to Santa Maria, then getting higher altitude clearance, at 0350. (Stern-FL)
- 6676.0 9VA40-Singapore Volmet, aviation weather at 1551. (PPA-Netherlands) Bangkok Volmet, aviation weather at 2042. (Lacroix-France)
- 6721.0 JNR-USAF, Puerto Rico, calling 280266 (a C-17A), ALE at 2330. (Cleary-SC)
- 6791.7 SSE-Egyptian MFA, Cairo, SITOR-A ATU-80 message to Nairobi, Kenya embassy, at 2038. (ALF-Germany)
- 6813.0 Unknown-Russian Vocoder station, 12 channels with a 3300-Hz pilot tone; similar emission on 9203, 10374, 10889, 12178, 13534, 15798, and 16579; at 1148. (Eddy Waters-Australia)
- 6909.0 C7CH-Russian military, CW flash-priority message to BZ1L, then traffic for many stations with 4-character callsigns, at 0300. (ALF-Germany)
- 6998.0 SH7-"Italian Crazy Pirate," CW markers and religious rants in Italian, at 1450. (ALF-Germany)
- 7527.0 Z13-USCG Sector Key West, FL, calling WHD (USCG Cutter Kodiak Island), also on 8912 (both COTHEN), ALE at 0400. (Mdmmonitor-MD)
- 7532.5 TTD-Unknown 3-letter net, calling EST, ALE at 1405. (Cleary-SC)
- 7630.5 AFA1WB-USAF MARS, Region 1 net with AFA1FZ and AFF1NO, at 1545. (Cleary-SC)
- 7632.0 Many MARS stations in SHARES Region 4 Net, others on 5236 and 6765, all at 1631. (Metcalfe-KY)
- 7696.0 RIW-Russian Navy, Moscow, coded CW traffic with RMZW, at 1934. (MPJ-UK)
- 7731.7 SSE-Egyptian MFA, Cairo, SITOR-B ATU-80 Arabic message to Beirut embassy, at 1540. (ALF-Germany)
- 7775.0 Sky Blue-British Antarctic Survey "Sky Blu Logistics Facility," taking net check-ins at 0240. (Mike Chace-Ortiz-ME)
- 8045.6 ALN-Unknown 3-letter net, also copied ALN, EDK, GHM, GWO, IRK, and MHE, at 1815. (Metcalfe-KY)
- 8050.0 FR5FEM-FEMA Region 5, MI, ALE sounding at 2018. (Mdmmonitor-MD)
- 8156.0 C6SH-Royal Bahamas Defence Force patrol boat, discussing a mechanical problem with Coral Harbour Base, at 1448. (Cleary-SC)
- 8181.5 JFHQME-Maine Army National Guard Joint Force Headquarters, ALE sounding at 1521. (Mdmmonitor-MD)
- 8211.9 OR-CW hobby beacon, Pike's Peak, CO, at 0028. (Hugh Stegman-CA)
- 8291.1 AKALN2-Petroleos Mexicanos (PEMEX), AKAL field platform N2, ALE sounding at 2326. (Mdmmonitor-MD)
- 8337.6 "01"-Partial callsign of weak station calling Shark 13 (possible USCG Cutter Comorant), clear and secure voice at 0044. (Mdmmonitor-MD)
- 8414.5 006010001-Cape Town Radio, South Africa, DSC general call at 1903. (PPA-Netherlands)
- 8800.0 Russian "Oblique" station (E11), AM callup 232/00, null message, at 0845. (Mike-UK)
- 8864.0 Reach 8050-USAF Air Mobility Command, working Gander at 1913. (Stern-FL)
- 8885.0 IT0001-Kingfisher Airlines, HFDL position for Bahrain at 1440. (Lacroix-France)
- 8888.0 Tyumen Volmet, aviation weather in Russian, at 0854. (PPA-Netherlands)
- 8983.0 CAMSLANT Chesapeake-USCG, position check with Coast Guard 2112 (HU-25C Falcon Jet), at 1915. (Stern-FL)
- 8992.0 Rican 78-MI Air National Guard C-130, patch via Offutt HF-GCS to Millington, TN regarding fuel, at 2108. (Cleary-SC)
- 9007.0 Canforce 2601-Canadian Forces CC-130, getting weather from Trenton Military at 1832. (Cleary-SC)
- 9015.0 AGAT-144-Ukrainian military, RTTY "Kriptograma" messages at 1400. (ALF-Germany)
- 9025.0 JNR-USAF, Puerto Rico, raised E30559 (USAF E-3B AWACS) in ALE, then voice as Puerto Rico patching Firebird 61 to Tinker Meteo and Raymond 24 (Tinker AFB, OK), at 1939. (Mdmmonitor-MD)
- 9237.0 Cuban CW "cut number" station (M08a), five-figure-group message in progress, at 1020. (Waters-Australia)
- 10201.0 RCV-Russian Navy Black Sea Fleet, Sevastopol, CW traffic to RKZ, at 1117. (MPJ-UK)
- 10202.0 119CDCS05-US Centers for Disease Control, ALE sounding at 1319. (Cleary-SC)
- 10390.0 20111-Moroccan Civil Police, calling 2518, ALE at 1439. (PPA-Netherlands)
- 10780.0 King 24-USAF rescue HC-130N, calling Cape Radio (Cape Canaveral Air Force Station, FL), no joy at 2217. (Stern-FL)
- 11095.0 REBOM1-PEMEX Rebomero platform 1, ALE sounding at 2146. (Mdmmonitor-MD)
- 11108.0 FC8FEM-FEMA Region 8 Communications Manager, CO, ALE sounding at 1547. FC6FEM-FEMA Region 6, TX, ALE sounding at 1612. (Mdmmonitor-MD)
- 11175.0 S4JG-US Navy aircraft, patch via Puerto Rico HF-GCS to Fiddle (Jacksonville, FL), at 1755. (Stern-FL) Reach 0171-USAF Air Mobility Command, patch Offutt HF-GCS to Denali Ops (Elmendorf AFB, AK) at 1927. (Cleary-SC) Collapse-US military, 28-character EAM at 2027. Offutt-USAF HF-GCS, NE, same EAM at 2029. (Jeff Haverlah-TX)
- 11214.0 King 24-USAF rescue HC-130N, radio check with King Ops (Patrick AFB, FL), at 2219. (Stern-FL)
- 11232.0 Goliath Alpha-USAF E-3 AWACS, patch via Trenton Military to Northern Lights (NORAD Eastern Sector, NY), at 2000. (Cleary-SC)
- 11345.0 Stockholm-Long-Distance Operational Control, Sweden, working unknown flight at 1042. (Lacroix-France)
- 11494.0 LNT-USCG CAMSLANT Chesapeake, calling K33 (USCG MH-65C Dolphin helo), ALE at 1934. (Mdmmonitor-MD)
- 11559.0 DL0004DAT-Possible USAF data net, ALE sounding at 0318. (Metcalfe-KY)
- 12202.5 Unid-North Korean MFA, Pyongyang, encrypted ARQ text, also using 13378.5 and 13533.5, at 0710. (Waters-Australia)
- 12222.0 I3L-US Customs Cessna 550, ALE sounding at 1647. (Mdmmonitor-MD)
- 12390.0 GYA-Northwood Meteo, UK, FAX weather charts for Middle East at 1957. (MPJ-UK)
- 12464.0 RGV82-Russian Navy warship, CW signal check with RGV92, at 1336. (MPJ-UK)
- 12577.0 273339310-Russian vessel Kaloeian (UBEF7), DSC safety test with Lyngby Radio, Denmark, at 1126. (Privat-France)
- 12812.0 Unid-Australian Military, idling data modem at 0850. (Waters-Australia)
- 12840.0 VTP-Indian Navy, Vishkapatnam, CW messages at 1030. (Waters-Australia)
- 13050.0 UDK2-Murmansk Radio, Russia, SITOR-B messages in Russian, at 1300. (PPA-Netherlands)
- 13057.6 Unid-Unknown military, encrypted text in Stanag 4285, also using 13430, at 1207. (Waters-Australia)
- 13238.0 70-Singapore Navy, calling CN3 in ALE, at 1101. (Waters-Australia)
- 13270.0 New York Volmet, aviation weather observations at 1343. (PPA-Netherlands)
- 13907.0 LNT-USCG CAMSLANT, working F12, a HU-25, ALE at 1501. (MPJ-UK)
- 13927.0 Tiger 61-USAF B-1B, patch via USAF MARS to Ellsworth AFB Metro, SD, at 2020. (Stern-FL)
- 14243.0 KC4AAA-Amateur at Amundsen-Scott South Pole Station, working KC4USV, McMurdo Station, both in Antarctica, at 0136. (Stern-FL)
- 14396.5 AFA3HY-USAF MARS, taking SHARES check-ins with NNNOVUV, US Navy/ Marine Corps MARS, weekly administrative net at 1600. (Metcalfe-KY)
- 14556.0 RIW-Russian Navy, Moscow, working RGV82 in CW, went to 12414, at 1342. (MPJ-UK)
- 15016.0 Tampa Tim-US military, likely airborne command post net, with a 28-character EAM simulcast on 4724, 8992, and 11175, at 2330. (Haverlah-TX)
- 16067.7 Unid-Egyptian MFA, Cairo, working Algiers in SITOR-A. at 1440. (PPA-Netherlands)
- 16231.7 Unid-Egyptian MFA, Cairo, calling Abu Dhabi embassy in SITOR-A at 0710. (Waters-Australia)
- 16270.0 OLZ88-Czech Republic MFA, Prague, calling OLZ78 in ALE, at 0754. (Waters-Australia)
- 16907.5 JMH-Tokyo Meteo, Japan, FAX weather charts at 0705. (Waters-Australia)
- 17468.0 RIW-Russian Navy, Khiva, CW message at 1037. (Waters-Australia)
- 18003.0 PLA-USAF, Lajes, Azores ALE sounding at 1248. (MPJ-UK)
- 18034.7 Unid-Egyptian MFA, Cairo, calling Madrid embassy in Arabic SITOR-A (ATU-80), at 0935. (Waters-Australia)
- 18403.0 XSS-UK DHFCS, calling YO5 in ALE, then short encrypted data messages, at 0954. (Waters-Australia)
- 18528.0 Unid-Algerian MFA, Rabat, 5-figure-group message to Kuwait embassy in Coquelet-13 (an old French teleprinting system), at 0948. (Waters-Australia)

Looking at the BEEs

This month we take an in-depth look at the Russian Navy system that is a frequent occupant of the HF spectrum and audible the world over. This common signal makes a great example to illustrate some of the principles of signal decomposition and finding non-random modem signatures embedded in otherwise encrypted signals.

❖ The BEE Modem

The Russian Navy's BEE or, more correctly, the T600 modem has been a long-term occupant on the shortwave bands and can be heard the world over, thanks to numerous high-powered transmitters and widely distributed naval facilities. The Digital Towers logbook contains some 185 frequencies from 3.5 MHz to 23 MHz, which is a pretty healthy average of about 10 channels per megahertz, virtually guaranteeing you'll bump into one at any time of day or night wherever you may be. You can download the full list of frequencies by consulting the web link in the Resources section.

Most common BEE signal parameters are 50bd, with shifts of 200, 250 and sometimes 500Hz. A VLF version can also be heard using 50bd with 50Hz shift on 18.1 kHz and it is believed to be used for submarine communications.

Until a couple of years ago, all signals used to idle at 36bd, hence the other name for this system "36-50." But nowadays, most units (but not all) idle and send traffic at 50bd. A rare "double speed" 100bd version is hardly ever heard (compared to the 50bd version), but one does appear quite regularly on 8004.5 kHz.

How do we know that BEEs are Russian in origin? If you listen long enough, on many channels you'll be rewarded with an exchange in CW that usually gives the callsign of the sending station and the outstation(s). Most of the broadcast transmissions are from RDL, the HQ, from facilities outside Moscow. Others are sent from RIT (Sveromorsk, Murmansk), RMP (Kaliningrad), and RIW (HQ Moscow, but using the Khiva transmit site in Uzbekistan).

With many of the broadcast transmissions being on-air almost permanently, they are frequently listed in the International Telecommunication Union (ITU) Monitoring files, which shows coordinates for transmissions from Murmansk, Kaliningrad, and other places with major naval facilities.

Although the modem can be used for regu-

lar point-to-point messaging, the predominant job of this system is to send broadcasts from major Russian naval bases to their extensive fleet at sea. Broadcasts using at least two or three parallel frequencies take place on 10, 20, 30 and 40 minutes past the hour on many of the following channels. These are your best bets for hearing a BEE.

5398, 5861, 8076, 10712, 11468, 14411, 14664, 15706, 15768, 16207, 16234, 16316, 17456, 18576, 19256 and 20268 kHz (center of data)

❖ On Closer Inspection...

Now to practice a bit of signal analysis. Having correctly tuned in a BEE, switching on your autocorrelation analysis tool will readily show that when in traffic, the signal is encrypted and shows ACF (autocorrelation function) of 0.

However, as the signal switches from idling reversals to traffic, a brief peak at 70 can be seen. This is a clue that we are seeing the signature of something non-random, the modem synchronization signal. Let's investigate some more.

After setting the correct speed and tone shift, many decoder packages allow you to display and save to disk the signal's demodulated binary stream of data. This is what we will do, collecting a few messages' worth of data from the signal.

Counting messages is easy to do in the case of a BEE, since the modem often takes pauses, idling on reversals (10101010...), which is a very easy rhythm to detect by ear. It also means we have a ready marker between messages in our data. In most cases, broadcast messages are short, so 10 or 15 minutes of recording usually provides half a dozen or so messages for analysis. Select a strong, stable signal with little or no fading to minimize decoding errors.

After loading the saved data into a text editor or word processor, the next job is to carefully split the data into chunks with some amount of idles at start, a message, and idles at the end. This is easier to do if you stretch the window as long across the screen as possible and use the text editor's "string find" function to find the reversals that separate messages. The built-in NotePad on Windows or TextEdit on OS X are perfectly fine for this kind of work.

Now, for each chunk, read along the initial reversals until the sequence changes. This is the start of the message. Cut and paste the first 10 or so reversals along with the next 100 bits of data on a separate line. Do the same for each of the other message chunks. You should end up with

something like this, with a few reversals at the beginning.

Message 1:

```
10101010100011110101101000001111
0101100101001010100100101010011001
0001110001001010011001001010101100
0110011000001110010010101010100110
0100011100010010100110010010101011
0001100110000011100100101111000000
0011101011000001011000111001
```

Message 2:

```
1010101010100011110101101000001111
0101100101001010100100100101001011
0101100100001111100100110000110100
0110011000011100100001101001010010
1101010001000011111001001100001101
0001100110000111001000011
```

You can easily see that each chunk contains the same starting string before drifting off into message data that is different in each case.

The final job is to move along each initial string, looking for the exact point when the bits start to change. In the case of our example, it's apparent that all messages have the same sync string:

```
1000111101011010000011110101100101
00101010010
```

Our final task is to see if other signals have this opening sequence, or whether it's different on other frequencies. In most cases, you'll have to follow the procedure above. In my case, the Hoka Code300-32 has a very handy "textfinder" feature that can be used to perform various operations like start or stop recording, save to disk, or beep on receipt of a certain text string. Maybe your decoder has something like this, too?

I simply entered the sequence above, enabled the textsearch and tuned in another signal. It seems that, in most cases, other signals do indeed carry the same signature.

❖ End of Message...

You can use the same technique as described above to discover the lead-out sequence of the modem that is used to end messages. Feel free to email me if you think you've found it, or if you found different sync strings.

Until next time, have fun pulling apart your digital signals.

❖ Resources

UMC's BEE Listing www.chace-ortiz.org/umc/db/modes/36-50.txt



A Tour of the Black Sea

As the deadline for this column approached, I got side-swiped by a nasty cold (after having been cold free for over two years). It hit me hard, and much to my frustration, I was bedridden for a couple of days. So, bowing to reality, I lay in bed and "twiddled" the dials on my shortwave radio, listening to a number of stations, or at least trying to. I heard or tried for a number of broadcasts from South East Europe and thought to myself, this is a region of the world that more or less tends to "fly under the radar." It would make for a good column.

So this month, we shine the *Programming Spotlight* on the Black Sea region. While some might consider it relatively insignificant in the worldwide scheme of things, it is increasingly relevant, due to its location and the nature of global politics. Six nations surround the Black Sea. These are Bulgaria, Romania, Ukraine, Georgia, Russia and Turkey.

Bulgaria and Romania have turned to the west, joining the EU and NATO. The Ukraine is torn between East and West, and, as this is being written, is in a verbal and diplomatic conflict with Russia over natural gas. Georgia's military conflict with Russia in recent months was well documented. The Black Sea resort of Sochi in Russia will host the Winter Olympics in 2014. Turkey continues to be a major player in the region, as it always has been.

❖ A Region of Turmoil

The nations of the Black Sea have seen their fair share of conflicts over the millennia, as one empire after another has dominated the region, then retreated before the next emerging power. The Crimean War was fought here in the 1850s, scene of the famous "Charge of the Light Brigade" -- one of those military blunders that happen all too often and are later "spun" as an act of heroism. One of those killed was a Private Charles Waterer. Also taking part in that war was a young Russian with a bit of writing talent by the name of Tolstoy. His work pops up now and then on the Voice of Russia. The appalling conditions during that war resulted in the setting up of the International Red Cross.

Later, a young seminary student grew up in the region by the name of Dzhughashvili, but he's more famous under his pseudonym: Stalin. During World War I, one of the more disastrous battles, Gallipoli, was fought for control of access to the Black Sea. And more

recently, during the Cold War, the Black Sea was a boundary between East and West (actually in this case, North and South), between the Warsaw Pact and NATO.

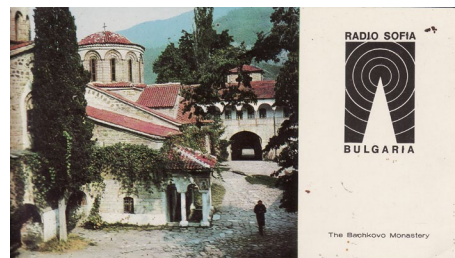
2009 marks the 20th anniversary of the end of the Cold War. While the Sea is subject to severe storms (both literal and figurative), the political waters have been much calmer in recent years. This period has marked a transformation of the region from one of conflict (Georgia being the exception) to one of peace and commerce. For the most part, all the nations of the region maintain friendly and profitable relations with each other. The Black Sea is the principal shipping outlet of both Ukraine and Russia. Pollution and over-fishing have led the nations of the region to co-operate to protect its environment.

Lets begin our tour of broadcasters at the western end of the Black Sea and travel around in a clockwise direction.

❖ Bulgaria

Radio Bulgaria was the first shortwave station I ever heard, back in 1978, and it continues to be heard reasonably well in 2009. While back then it was one of the hard line pro-Moscow stations of the Eastern Bloc, today the difference in tone is quite astounding, not unlike many former Soviet satellites. Back in 1978, I was 17 and an enthusiastic SWL. I entered an essay contest sponsored by the then Radio Sofia, Bulgaria, and actually won third prize. As I recall, the essay was about Georgi Dimitrov, one of the early leaders of the Bulgarian Communist Party, who fought a memorable court battle (and won) with Hermann Goering. It was perhaps the last fair trial in the Third Reich.

Regardless, a few months later I received a very battered parcel in the mail from Bulgaria. Upon opening it, my prize turned out to be what every asthmatic needs and wants...a



marble ashtray and cigarette holder. At least the ashtray arrived in one piece, the cigarette box not so much.

Todor Zhivkov was the Party Boss in Bulgaria in the '70s and '80s. Radio Sofia was full of praise for him and his accomplishments and those of the party, and of course of their Soviet allies. The propaganda was thick and heavy. But there was enjoyable cultural programming as well, much like today.

Today's Radio Bulgaria broadcasts to North America at 0000 and 0300 UTC on 5900 and 7400 kHz. Each daily transmission opens with *News*, followed by *Events and Developments* (or *Views Behind the News* on Sunday and Monday UTC broadcasts). These programs are followed by daily regular features.

Monday - Folk studio, (Keyword Bulgaria), Walks and talks, (Folk studio)
Tuesday - Sports, Keyword Bulgaria, Time out for music
Wednesday - Magazine economy, Keyword Bulgaria, Time out for music
Thursday - The way we live, Keyword Bulgaria, Time out for music
Friday - History club, Keyword Bulgaria, Time out for music
Saturday - Keyword Bulgaria, DX programme, Time out for music
Sunday - Keyword Bulgaria, Answering your letters, (Time out for music)

The tone of today's Radio Bulgaria is different from its cold warrior predecessor. There are more features today about religious themes and of course Bulgaria has embraced the EU and the market economy. One thing that has only varied slightly is the depth of fantastic music one can hear. Secular, non-secular, jazz, folk, rock -- you get it all on Radio Bulgaria. And the DX program recently celebrated its 50th anniversary!

❖ Romania

Radio Romania International was spotlighted in the October 2007 *Programming Spotlight* column. In Glenn Hauser's January 2009 *Global Forum* column, it was reported that RRI had several new transmitters installed, significantly boosting their formerly weak signals. North American listeners can try 21.30 - 22.00 6115, 9755; 23.00 - 24.00 6115, 9610; 01.00 - 02.00 6145, 9515; 04.00 - 05.00 (West Coast) 6115, 9515 One can also hear Radio Romania International online (although not from what I can see, on demand) at www.

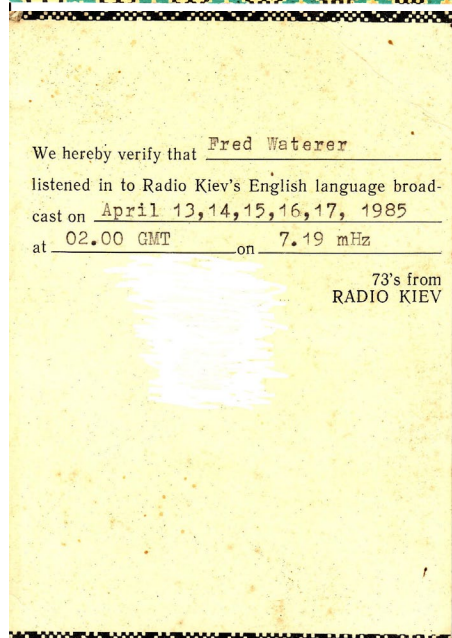
rri.ro/index.shtml?lang=1

The program schedule for RRI is as follows:

Monday – Pro Memoria, the RRI history program.
Tuesday – Business Club a weekly look at Romanian business and industry
Wednesday – Society Today A look at the people of Romania
Thursday – Travellers Guide, which looks at various travel destinations in Romania.
Friday – A Challenge for the Future looks at events on the horizon in Romania and the World. Not surprisingly economics has dominated recent editions.
Saturday – World of Culture, the Romanian cultural magazine program followed by RRI Encyclopaedia
Sunday – Inside Romania, followed by Sunday Studio

❖ Ukraine

Like Radio Bulgaria, Radio Ukraine International has also had quite a transformation from Soviet times. Prior to 1992, Ukraine was



a republic of the Soviet Union, and Radio Kiev, as it was known, had a reliable signal, and was a reliable echo of whatever was the party line from Moscow at the time. Since the collapse of the Soviet Union, I've noted a significantly independent tone from RUI...when I've been able to hear them.

Each daily transmission from RUI begins with a newscast and is followed by feature programming. From Monday to Thursday, this consists of **Ukraine Today** – a digest of the day's news, and **Close up** – a "daily analytical programme on Ukraine's life."

On Fridays, one can hear **Roots**, a "cultural and educational programme."

Saturdays, it's **Ukrainian Diary**, a digest of the most important news over the week, followed by **DX-Programme**, the weekly program for radio listeners and DXers. Saturday broadcasts conclude with **Hello from Kyiv**, the RUI mailbag program.

In my opinion, the real treat comes on Sunday. Following news and **Ukrainian Diary**, one can hear **Music from Ukraine**. This program provides some of the most beautiful music on the planet, from Ukrainian choirs to folk and pop music. A recent edition featured a toe tapping number that reminded me of Balkan "turbo folk" -- a "blend of Roma music, Turkish 'Arabesque' and Greek pop folk music, and Serbian brass bands on one side, as well as rock and roll and contemporary electronic dance music on the other." (Wikipedia)

Look for this wonderful music here in North America at 0100 and 0300 UTC on 7440 kHz. Or listen online. Programs from Radio Ukraine International are also available on demand via the website at www.nrcu.gov.ua/index.php?id=780 I particularly like this option and it's wonderful to hear these programs in near CD quality.

One can listen to the live feed of Radio Ukraine International via this link (one must have Real Player to listen) <http://www.nrcu.gov.ua/index.php?id=308>

Just to be confusing, this schedule is listed in Kiev time. Add 2 hours to the current UTC time.

❖ Georgia

Sadly, Georgia has no external radio service. One must rely on its not always unbiased neighbors for coverage, unless something dramatic happens and the international press gets involved. The Radio Free Europe-Radio Liberty website often offers coverage of the region. www.rferl.org

I also like the coverage offered by the *Moscow Times*, a relatively independent news source. www.themoscowtimes.com/

❖ Russia

While the 2014 Sochi Winter Olympic Games are some way off yet, Voice of Russia broadcasts are ramping up their coverage of the event. It will be interesting to see if the Voice of Russia adds more *Russian by Radio*



language courses as they did in the lead-up to the 1980 Moscow Olympics. Since much of the world boycotted the 1980 games in protest over the Soviet invasion of Afghanistan, this will be Russia's showcase sporting event for some years to come, much like the Beijing games were a coming out party for China last year.

Until quite recently, the Voice of Russia had a page dedicated to the Sochi Olympic preparations, but as this is written early in the new year, that page is absent, or just hiding for now as they promote a New Years contest. Sochi has come a long way from Josef Stalin's favorite holiday spot. It was Stalin's version of "the winter White House." It's a curious location for the Winter Olympics.



Voice of Russia is certainly a place to go to for news of the region including the conflict with Georgia. Ukrainian-Russian relations have also been strained by disputes over natural gas distribution. As the Georgian conflict recedes, VoR seems to have stopped updating their section on the South Caucasus region. It seems to have been forgotten about mid-December as far as daily updates go. You can read it at <http://www.ruvr.ru/main.php?lng=eng&e=193&p=18.12.2008>

I hope it's not a fluke, but Voice of Russia was beaming in a killer signal from 04-05 UTC in January on 7335 kHz. I can't recall hearing it so well since the Soviet "Radio Moscow" era. A quick "google" suggests the transmitter is in French Guiana. Let's hope it keeps up.

❖ Turkey

The Voice of Turkey had a podcast on its website (when this was written) from a recent 13-part series called "The Black Sea" which highlighted the nations, issues and challenges facing the region. Anyone with an interest in the Black Sea region would find it of great interest.

Voice of Turkey has a fabulous new website, highlighted in the February 2009 *Monitoring Times*, which is pretty useful and has a lot of audio on demand. But no program schedule that I could find. I hate radio stations that treat program schedules like state secrets. Oh well. You can access the podcasts at <http://trt.net.tr/Galeri/Podcast.aspx?dil=en> You can try for the Voice of Turkey in English at 0100 UTC on 6165 kHz, and at 0400 UTC on 6020, 7240 and 7325 kHz.

The Black Sea region is a fascinating place, full of good programming and great music. Give it a listen!

Utility Intrusions into the SWBC Bands

Certain bands are allocated exclusively for broadcasting, while others are shared. Consult this reference:

www.monitoringtimes.com/html/swb.html

Yet, there are persistent intrusions by various non-broadcast transmissions into the "exclusive" SWBC bands. They are of several types.

Radioteletype is probably the most pervasive and damaging to SW broadcasters and their would-be listeners. The worst examples we constantly hear are on 9830, 11687.5 and 12015 kHz.

Identifying them has not been easy. Searching utility DX reports, past issues of *MT*, and online references fails to turn up anything conclusive. Perhaps the transmissions are encrypted, or utility listeners with RTTY equipment/software just aren't interested.

We concentrated on 11687.5 and uncovered some leads: Lennart Deimert reported via Mauno Ritola, that 11688 is a frequency of the Black Sea Fleet, from Sevastopol, Crimea, shared by Russia and Ukraine, call-sign RCV. There have also been old logs of the French navy on 11687.5. But the signals are so steady and persistent in central North America, that we doubt they are coming all the way from Crimea.

Noel Green, NW England, agrees, since he hears no trace of them around 1400, nor did he previously when there were complaints from North America of RTTY interference to R. Jordan when it was active on 11690. Now HCJB, Cuba and Deutsche Welle are the main victims, but do they know it?

Andy Reid, Ontario, found an old listing in the 8th edition of *Confidential Frequency List*: 11687.5 NAA Cutler, Maine, USN. Maybe that's it; he hears it all day long during daylight. What about 9830 and 12015, which broadcasters are entitled to use, but had best avoid?

It's hardly a major problem, but a curiosity: we were hearing again

this winter a one-minute V/CQ marker on 6074 at 1400 UT, from a tactical call "8GAL", probably from East Asia. It immediately follows the closing time signal of Radio Rossii on 6075, or overlaps it.

We often hear two-way Spanish SSB within the SWBC bands, mostly in the daytime, especially on 19 meters. Due to heavy accent, engine noise, dialect full of expletives, we can understand very little and doubt native speakers could either. We suspect these are narco-traffickers or poachers, and they seldom appear on the same frequency more than once. Usually they avoid exact broadcast frequencies, but sometimes "hide" underneath them.

CODAR, ocean wave radar, also useful for detecting submarines, we have discussed before. It's a big problem on the 60m tropical band, but we have no recourse there, since that band is not exclusively for broadcasting. It also swishes around 12.2 and 13.6 MHz shared with broadcasting. Now it may be invading the exclusive 9 MHz broadcast band, as we have a report from Michel Viani, São Paulo in the radioescutas Yahoo group of CODAR interfering with Ukraine when it was on 9785 at 2140.

Broadband pulses 20-30 kHz wide are frequently heard both inside and outside the broadcast bands, believed to be over-the-horizon radar from Cyprus. This keeps moving around, too. Several weeks of logs at many different times by Wolfgang Büschel and myself found this sometimes interfering directly with broadcasters, sometimes far afield: 8590-8615, 8955-8985, 9055-9085, 9315-9345, 9360-9380, 10200-10230, 10975, 10990-11020, 11470-11490, 12277-12313, 15137-15163, 15315-15345. Why can't they find some good clear spots outside the broadcast bands and stay there?

...Not that broadcasters are without sin in keeping inside their bands; for example, see UZBEKISTAN.

ANGOLA RNA noted regularly on distinctive off-channel 7217 (Chris Greenway, Kenya, BDXC-UK Communication) New Year's Eve at 0000 on approx. 7216.75 (Thomas Lindenthal, Germany, A-DX via BC-DX)

AUSTRIA [and non] OE-1 remained on SW as before past Dec 31, and is also registered for A-09 effective March 29, including the Sackville relay which then will be 1500-1600 on 13775, ex 1600-1700 on 13675. But mostly in German with the English broadcasts terminated; 5-minute Spanish news segments survived M-F at 2155, Tue-Sat 0000, 0030 and 0100.

The 4-minute English news from domestic service, M-F at 0708 on 6155 also continued, but very little about Austria (gh) That English segment was also repeated at 0045 on 7325 (gcerow, psw yg) No mention of these bulletins on updated ORF International schedule, so maybe a last minute decision, throwing a bone to the Report listeners who protested the cancellation (Will F., PA, DX LISTENING DIGEST)

BANGLADESH 4750 was inaudible from Kolkata; I got a prompt reply from the station in early January: "At present 4750 kHz is in trouble. There is no other SW transmission for HS. Please try to reach 693 kHz MW. Thanks, Senior Engineer, RRC, BB, Dhaka" (Dr. Supratik Sanatani, India, DXLD)

BOLIVIA Radio Kawsachun Coca has a blog: <http://radiokawsachuncoca.blogspot.com/> (José Miguel Romero, Spain, DXLD) The coca-promoting station on 6075, but not reported recently, still on the air? Neat blog with lots of photos (gh) See also the company which installed their SW antennas, JOPACH, <http://jopach.com/> on the page *Nuestro trabajo* where they spell it Radio Causachun Coca. However you spell it, that means "long live coca" (Henrik Klemetz, Sweden, HCDX)

BRAZIL New Observatório Nacional timesignals, Rio, heard at 1800 on 10010 USB plus carrier, instead of 10000. They need a good crystal; or have they heard my plea to get away from WWV? Hope they stay there. But audio was horribly distorted (Roland Zurmely, Brasil, radioescutas yg) Sometimes on 10010, sometimes on 10000. Local time checks every 10 seconds, woman's voice (J Ricardo, HCDX)

CANADA CFRX reactivated 6070 in mid-December, now with good signal in daytime (Bill Harms, Maryland, DXLD)

Better than ever! This shows how good it can be, full modulation and getting the max out of only 1000 watts, giving CVC Chile a run for its money at night, SAH of about 6 Hz. Also audible daytime here but weaker at mid-day. Has a good talkshow from CJAD Montreal weeknights at 0605-0800; see www.peteranthonyholder.com (gh, OK)

From the engineer himself: "CFRX is back on at 1000 watts and sounds great near field. The transmitter having recently been repaired and retested at the Armstrong factory in Syracuse NY is running full out and very well" (via Steve Canney, VA3SC, via Niel Wolfish, WORLD OF RADIO) Odd hearing traffic reports for Toronto on shortwave (Bill Hepburn, Ont., WTFDA)

And lots of commercials in drive-time. CFRB ought to charge a premium on ad rates as long as SW is on the air, functioning properly, and not subject to random overrides for SW IDs. But they would be laughed out of the ad agencies. At the mercy of co-channel; Romania collides at 22-23 but not in A-09; CVC Chile all night from 0000 now, from 2300 in A-09 (gh)

All Sackville transmissions were off the air Dec 13-17, not just RCI, but big signal relays of CRI, KBS World Radio, NHKWNJR, Voice of Vietnam, R. Austria, R. Sweden, Vatican Radio, R. Prague, R. Nederland, R. Monte Carlo, V. of Turkey. Worst-hit were KBS and VOV, which are pretty hard to hear direct in North America. This coincided with ice storms in New England (gh) I spoke with another "Rob" at the Sackville station by phone; he said the power was out, no known antenna damage (Rob Peebles, W8LX, DXLD) Problem was traced to the "main sub-station," power company people working at the site with them and sourcing replacement switch-gear (Jeff White, FL, ibid.)

RCI English to USA in B-08 scheduled 0005-0105 on Sackville 9755, but poor signal and in Portuguese to USA on UT Mondays instead of Maple Leaf Mailbag. We were getting RCI much better and in English via the Kunming, China relay southward on 9880! Basic propagation: in evening should use lower band in winter, higher in summer; yet in A-09 RCI is moving Sackville down to 6100 for this, English presumably at 2305 during DST; and

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; sesqui = one and a half; B-08=fall/winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

Kunming relay will be on 11700 at 0000 (gh, OK)

CHINA Guangxi FBS, Nanning, broadcasts in Vietnamese, setting it apart from domestic services; heard chime IS, IDs in Chinese and Vietnamese at 0000 on 9820, scheduled 2300-0100. CNR-2 program via Xi'an also scheduled on 9820 but not heard. Possible only when Habana is missing (gh, OK)

5050, Guangxi FBS, 1551-1601*, mostly in Vietnamese, frequent short segments in English with professor talking about his experiences in China; very faint QRM from Voice of Strait. Guangxi Zhuang Autonomous Region is contiguous to Vietnam; hence they broadcast a lot in Vietnamese (Ron Howard, CA, DXLD)

COLOMBIA R. Juventud, a pirate in Pasto, heard in early January on a Saturday at 2320-0030 on 5553.5. I had the operator's phone number, so called Sr. Omar Alberto Cabrera who told me they were testing on SW, and had three crystals: 5555, 5585, and 5590 but they were slightly off and would try 5588 next between 2300 and 0100 during the *Carnaval de Negros y Blancos* (Rafael Rodríguez R., Bogotá, *condiglist* yg) Think I heard it two nights later at 2305-0050* on 5554.99, mostly LA music, 300 watts, and two more nights on 5555.00 (Anker Petersen, Denmark, *WORLD OF RADIO*) Heard here on 5587.4 and then 5553.5 (Rodríguez, *ibid.*)

10770, Radio Nacional de Colombia, 1907-1945 in noisy AM mode, music; another day at 1345 (Yimber Gaviria, Cali, Colombia, DXLD) Most likely local mix with strong MW 580 outlet (gh)

CONGO 9 Jan at 1820 on 6115 a station in Afro-French with talks about Congo. Audio was switching from good to real poor. Around 1849 I guess there was a "Radio Congo" ID and then off. Maybe Brazzaville firing up a transmitter again (Jari Savolainen, Finland, DXLD) had been inactive a long time (gh)

CUBA Not only Radio Martí, but VOA Spanish is jammed by the Cubans who don't care whether they also impede non-Cubans from hearing it, even during innocuous music shows having nothing to do with Cuba. Meanwhile RHC broadcasts without any fear of jamming from the USA, even in retaliation.

But RHC is a case-study in SNAFUs we log day after day without really trying. Sometimes there is a quick echo on some frequencies which we first thought was long path/short path, but then discovered they were running two separate unsynchronized transmitters and antennas on a single frequency, e.g. Esperanto Sundays at 1500-1530 on 11760; English daily at 2300-2400 on 9550. These and several other broadcasts are designated for N&S America, so that's one way of doing it, instead of one transmitter with a non- or bi-directional antenna.

There are different delays in getting the program feed to three different transmitter sites, which is normally obvious by comparing two different frequencies on two receivers. Besides listening for an echo, see if there is a subaudible heterodyne between the two transmitters on slightly different frequencies. (gh)

ECUADOR On Dec 24, crews removed the last of the tall antennas and towers at HCJB's Pifo transmitter since they would obstruct the flight path of the future international airport for Quito. Pifo went on the air in 1953. With 14 other shorter antennas and towers still standing, the transmitters continue to broadcast 60 hours per day. All SW broadcasts from Pifo are projected to end no later than April 1, 2010 (HCJB Global News via John Wesley Smith, DXLD)

EQUATORIAL GUINEA [and non] A federal judge delayed the trial of jailed evangelist Tony Alamo on charges he took young girls across state lines for sex. U.S. District Judge Harry F. Barnes reset Alamo's trial to begin on May 11. The trial had been scheduled to begin on Feb. 2, but Alamo's lawyer, John Wesley Hall, Jr., objected to the start date, saying he needed more time to prepare (Tony Alamo News)

Meanwhile Alamo continued to broadcast, heard occasionally on R. Africa, 15190 around 2200; and WWCN, 15825 at 1400. Reruns? How do you tell? That's nothing; several evangelists have kept broadcasting long after death without being resurrected (gh)

ERITREA Voice of the Broad Masses of Eritrea heard only on 7220, regularly at various times of the day, not continuous. Signed on for evening at 1400.

Radio Bana on 5100 was heard regularly, and without any jamming. An English-language lesson heard on a Sat at 1745-1803*. English also heard just after 1500 (Chris Greenway, Kenya, BDXC-UK Communication)

ETHIOPIA Re the unID on 6090 last month: Audible here in Finland; most probably operated by Amhara Mass Media Agency in Ethiopia, as they announce the AMMA e-mail address. Strength suggests it's coming from Geja transmitter centre [near Addis]. Is 6090 called "Amhara Kilil Radio", as it sounds like that? (Jari Savolainen, Finland, DXLD)

An Amharic-speaker has translated the announcement repeated on the new 6090 station. It says the tests are from Amhara Regional State radio at 0300-0600, 0900-1100 and 1400-1700 GMT. I have confirmed these times to be correct. It is announcing three frequencies: 6090, 7264 (sic) and 9740. I have only heard 6090, which has good signal strength. I've also heard the email address of ammawebmaster@yahoo.com. The tests on 6090 are not in parallel with Amhara State radio which is heard on the listed 801 MW.

I can hear a total of 11 SW transmitters from Ethiopia at present. The M-F English broadcast from R. Ethiopia National Service on 5991, 7110, 9704 is now at 1200-1300 with news at 1230, ex 14-15 (Chris Greenway, Siaya District, western Kenya, *WORLD OF RADIO*)

[non] New TDP-brokered station - Radio Bilal in Amharic from Jan. 11: Sundays 1700-1800 on 9610 via Samara, Russia, 250 kW, 188 degrees to Eaf (DX Mix News, Bulgaria) Unheard at 1705 that day (José Miguel Romero, Spain, DXLD) And blocked here anyway of course by RCI. Searches point to an FM station in Kampala, Uganda (gh)

FRANCE The situation at RFI as of mid-Jan, based on sometimes conflicting press reports: 206 of 1042 jobs were being cut, including 106 journalists. German, Polish, Serbocroatian, Albanian, Turkish and Lao would cease on Jan 31. As previously for Russian and Chinese, RFI denied reports about a closure of its Persian service. These may not be canceled until 2011. Perhaps contracts with TDF for transmissions on shortwave, expiring in 2010/2011, will not be prolonged. This could mean *all* shortwave transmissions of RFI, including those for Africa (Kai Ludwig, Germany, DXLD)

INDIA On one day only, Jan 7, the AIR GOS in English to Southeast Asia at 1330-1500 was on 9870 instead of 9690. Both are Bangalore, but 9870 normally carrying the Vividh Bharati Service has a much better signal here. Presumably a mistake, or a substitute while 9690 was down (gh, OK)

Glenn, I listened the next day at 1330-1430 to AIR on 9870 and heard no English except for the India Oil Co. ads. I think your theory about a switching anomaly is correct. I wish you would campaign for AIR to use this channel and transmitter for English to North America. They come in here to beat the band -- far better than any other frequency or time (Bruce Barker, PA, DXLD)

ITALY [non] R. Joystick, which began on R. Milano International in 1985, returned from January 2009 via IRRS, the first Saturday of each month at 0900-1000 on 9510 via Slovakia; besides music, will inform about Malta which lacks external radio (Charlie Prince, R. Joystick, Germany, BC-DX) Then IRRS added another airing of *WORLD OF RADIO* the other Saturdays at 0900; but in A-09 both one UT hour earlier at 0800 (gh)

KENYA KBC is definitely off SW altogether. I drove to the Langata SW transmitting station on the outskirts of Nairobi and found that it was still there. Someone on the gate confirmed that the station was no longer operating. The KBC Eastern regional service (which had been carried on 4915) is now only aired via local MW opt-outs. A recently-leaked report by the official audit office says the KBC is technically insolvent (Chris Greenway, Kenya, BDXC-UK Communication)

LATVIA On 30 December 2008 at 1300 the last broadcast with 100 kW from the 9290 kHz relay service took place. The relay license-holder reported that a new service would start sometime in February 2009 with test tones and alignments, but max power 10 kW (Tom Taylor, HCDX) Beware of Euoripates on 9290 from somewhere else (gh)

LITHUANIA David Crystal from Israel phoned to say that he heard Radio Vilnius announce at the end of the Dec 31 program that as of January 1 they would no longer use shortwave but continue to broadcast on the internet. Website says English is live at 1900, then podcast, archived; see www.lrt.lt/archyvas/?channel=234933&ion=2&filter=7345 (Mike Barraclough, England, DXLD)

Shucks, they forestalled any protest campaign (Glenn Hauser, *ibid.*) One hears that this is a sheer cost-saving measure. Lithuanian Radio had to cut 500,000 Euro of expenses, and this forced them to sacrifice shortwave (Kai Ludwig, Germany, *ibid.*)

Also ceased SW relays of Racja shortwave service to Belarus due to other budget priorities, but expected to be back on the air latest during spring (Wolfgang Büschel, BC-DX)

Also ceased several relays of Iran to Europe. Reception was better direct, anyway. But KBC Radio on SW continued, 2130-2230 on 6055, Sun 0200-0300 on 6110 (Kai Ludwig, Germany, DXLD) In A-09 reserved 9555 for Racja service at 06-16; for R. Vilnius possibly resuming: 07-15 9710, 15-17 9755, 23-01 9875, 00-04 11690 in Lithuanian, English, the last two for NAm, but never really used all those hours (gh)

MÉXICO The 6105 transmitter in Mérida, Yucatán, which had been sporadically relaying Candela FM experimentally, switched to two other sources from the same group, first heard Dec 19 at 2030, peaking at 2200, IDs and comments mixed in Maya and Spanish. This is from "Yoól lík" 810 kHz, XEMQ, scheduled 1100-0100. Later that evening also heard first relay of XENK, "La 6-20" from Mexico City, as scheduled 0100-0500 (Julián Santiago Díez de Bonilla, DF, DXLD) Remains very tough here; sometimes I hear a het on VOA around 1400, presumably this on 6104.8 (gh, OK) Heard at midday 1817 in Maya with vocal sound effects (Steven Wiseblood, TX, DXLD)

An individual ham operator, José Antonio Martínez Sánchez, XE1A, has taken it upon himself to "reactivate" R. México Internacional, but as a webcast only, featuring lots of good music and even news in Spanish, promotions for SW. Go to <http://rmi.es.mn> which forwards to www.qsl.net/xs1a/Radio/ where a player launches. It's really unrelated to the original XERMX but a nice gesture (gh) News at 1700, 1900, 2100, 2330 and 0300, he tells us, and the webcast is in test phase until a launch in March (gh)

NEPAL Some schedules still show R. Nepal on 5005, but as of February 2008, Victor Goonetilleke reported it missing, and I have not seen any reports of it since. WRTH 2009 says it is irregular (gh) Hearing a carrier on 5005, and a friend at R. Nepal says it's active (Al Muick, Afghanistan, DXLD)

NIGERIA [and non] I recommend the program *Time For Highlife* from the Voice of Nigeria in Lagos, Saturdays at 1930-2000 on 15120. Signal has been better lately and audio problems corrected; all good music with

some history on the artists. After that, tune in *Music Time in Africa* on VOA 13710 or 11975 kHz, and you have a sesquihour of good afropop music with some education thrown in (Scott Walker, PA, *swprograms*)

[non] 15180, Aso Radio International, *1600-1657*, local drums, flute music, several IDs. Talk in presumed Hausa, relayed from where? (Brian Alexander, PA, *DXLD*) WRTH 2009 says via Samara, Russia, M-F (gh)

PALESTINE [non] New clandestine? UnID in Arabic on 5815 // 5835 from January 8, 1742-1852; 5835 collides with VOA Deewa Radio (José Miguel Romero, Spain, *DXLD*) About Palestinian politics, suddenly off at 2115 (Mauno Ritola, Finland, *Cumbre DX*) Relays the audio of Al Aqsa TV channel I get on satellite but not exactly synchronized with that or the two frequencies with each other; reminds me of Iran's Arabic service (Tarek Zeidan, Cairo, *DXLD*) Iran has plenty of spare SW transmitters and supports Hamas (Wolfgang Büschel, Germany, *ibid.*) Weak here, so doubt it's from Iran (Al Muick, Afghanistan, *ibid.*)

This lasted for at least another week during the Israeli attack on Gaza. Widely reported in Europe but difficult in NAM due to timing (gh) Al Aqsa TV audio on 5815.05 and 5835.05 from 2052, clear and fair, Arabic male talk, several clear mentions of Hamas (Terry L Krueger, FL, *DXLD*) 5835 better until 2131* than 5815 until 2135* (Steve Lare, MI, *ibid.*) May have replaced Al-Aqsa's FM radio station knocked off the air in Gaza (Kai Ludwig, Germany, *ibid.*)

PERU An unID on 6195.80 in Spanish 1040-1105, no ID on hour (Robert Wilkner, FL, *DXLD*) R. Cusco, reactivated, with hours and hours of religious programming from the Iglesia Dios es Amor [see BRASIL], heard at 2204-2310 and again at 1100. Previously was on 6194.3, last heard in August 2007 (Rafael Rodriguez, Colombia, *condiglist* yg)

A personage who has run repeatedly for mayor of Huancabamba and lost, Federico Ibáñez M., follows up by putting pirate SW stations on the air to criticize the winners. Latest is called R. Nueva Super Sensación, on 6536, heard Jan. 11 at 2230-0100 with folk music, some QRM from aeronauticals.

Previous ones over the past ten years around the middle of the 6 MHz band have been called Radio Comercial, La Voz del Rondero; Radio Andina; Radio Sensación; Radiodifusora Huancabamba; Radio San Miguel; Radio La Poderosa; Radio Estación 2. I have written to every one of them and never gotten a reply. Perhaps in another couple months or a year he'll be back under yet another name (Rafael Rodriguez R., Colombia, *condiglist* yg)

PHILIPPINES PBS on 6170.5 at 0956 in Tagalog, 1000 ID in English to 1006*, next day better at 0835 music, 0846 ID as 78 DZRM, Radyo Magasin (Iwao Nagatani, Japan, *DXLD*) A rare one! WRTH 2009 has no info about it besides that the frequency varies, and not recently confirmed. Their 31m outlet is shown as 250 watts on 9619v or 9580, DUR2, 0000-0930v; also not reported in a long time. Now PBS registers 6170 as 2300-1600 daily with 10 kW at 15 degrees, good for Japan; also 11950 at 1000-1200 with 50 kW at 212 degrees, both from Marulas site; is anyone hearing that? (gh)

SYRIA R. Damascus still on the air, carrier but no modulation on 9330 in German at 1800, French 1900 until abrupt 1940*. Listen on satellite or download instead (Kris Janssen, Belgium, *DXLD*) Also heard another day until abrupt 1931* Poor to fair with somewhat low modulation and hum. Must use ECSS-LSB to avoid WBCQ from *1858 (Brian Alexander, PA, *ibid.*) WBCQ modulation distorted due to Syria on slightly different frequency, overridden with BFO on (gh) Bad audio in Spanish at 2212 (Yimber Gaviria, Colombia, *DXLD*) A complete waste of kW, just like Cairo; what a pair (Raúl Saavedra, Costa Rica, *ibid.*)

Arabic station at 1757, 2125 on 3406-LSB, a few seconds ahead of audio on // MW 918 and ID as Syria (Jari Savolainen, Finland, *DXLD*) Aero band, so using aero transmitter? Another strange one, during Israeli attack on Gaza; see PALESTINE (gh)

UGANDA R. Uganda, 4976 at 0410 world news in English on well-modulated signal (Robert McEntee, TX, *DXLD*) 4975.9, Radio Uganda, (presumed), same date at 0412-0419, seems news in English, poor, barely above noise level, 0419 fading (Jim Evans, TN, *Cumbre DX*)

Clearly IDs as UBC Radio, no longer Radio Uganda; runs a single SW transmitter on 4976/7195. 4976 remarkably weak, only about 130 miles from Kampala, must be well under 10 kW and audio quality poor. I expect that once modernization of the MW network has been completed, UBC will close its SW service.

Radio Dunamis on 4750 was heard with excellent reception in the evening (Chris Greenway, Kenya, *BDXC-UK Communication*)

USA On Dec 29, FCC accepted for filing an application for a construction permit to George S Mock (d/b/a Hill Radio International) for a new HF station in Milton FL (FCC press release via Ben Dawson, *DXLD*) Mock, WB4BFO, plans to broadcast from his home with a custom-built transmitter and a 4-element cubical quad at 90 feet above ground. He told me that he hopes to name it WJHR and it would broadcast exclusively in SSB, emission type B8E, with zero carrier power. Would be supported by contributions from churches and play recordings made over 40 years at Smyrna Baptist Church, Pensacola. That church had a CP but this apparently replaces those plans (Benn Kobb, DC, *ibid.*)

The church backed out after a consulting engineer explained to the congregation what it would cost to build a 50 kW SW station on AM.

What kind of audience support could a pure SSB station expect? Maybe just a pet project (gh)

FCC also accepted for filing an application for a license to KTM1 in Albany, Oregon (rather than Lebanon which may remain the nearby transmitter site). This implies the station is 100% complete and ready to go on the air (Ben Dawson, WA, *DXLD*) Next step is program test authority, on 6025, 9445, 11615 (Benn Kobb, *ibid.*) But a visitor to the site has been unable to verify any construction (gh)

Ted Randall's new programs QSO and Radio Disclosure on WBCQ are just what the shortwaves need. SWLs are looking for something different and a bit more technical than the "mainstream" fare offered by domestic broadcasters. Glad he is with us (Allan Weiner, *DXLD*)

Sked as of January had changed to: Tue/Wed/Thu 2200-2400 on 7415, with QSO on Tuesdays. Also on WRMI 9955 Sun 0600-0800. Like all programming on these stations, and WWCRC, shifting one UT hour earlier from the start of DST on March 8 (gh)

WORLD OF RADIO schedule on WRMI 9955 and webcast <http://68.142.10.147:8000/listen.pls> to start 2009, before the timeshifts: Wed 0600, 1630; Thu 0630, 1630; Fri 0200, 1230; Sat 0900, Sun 0900; Mon 0600; Tue 1200, 1630. We also heard it Mon 1630 (gh)

WWRB, 5050, putting out first and second order spurs, heard at 0334-0350 on 5018.6, 5034.3, 5065.7, 5081.4; also unID on 5002.8 (Mark Taylor, WI, *DXLD*) Surely that too is WWRB, all 15.7 to 15.8 kHz apart; maybe really 15.75 like old analog horizontal TV scanning frequency; any connection? (gh)

4050, KWMO, Washington, MO, at 0900, 3rd harmonic with nice strength on peaks. Country music with frequent IDs "The Mouth 1350 AM" and "The Mouth is KWMO, Washington". Night power is 84 watts (David Hodgson, TN, *harmonics* yg)

4440, WSRG, Fair Bluff, NC, 0745-0845, 3rd harmonic of 1480. A semi-regular here. "Country Gold", local ads, very weak but fair on peaks (Brian Alexander, PA, *DXLD*)

[non] VOA website language schedule announced on Dec 31: "Radio broadcasts in Ukrainian will end on December 31, 2008" (Dragan Lekic, Serbia, *DXLD*) Got a reprieve in August; time ran out (gh)

Effective 31st December 2008, VOA Urdu dropped all SW services to South Asia. Only MW 972 and 1539 kHz are available at 1400-0200. There are many listeners in India and Bangladesh who are listening to this Urdu service on SW and many more especially after the closure of VOA Hindi service (<http://dxasia.info/news/> via Dragan Lekic, Serbia, *DXLD*) As of 9 Jan, VOA Urdu (Radio Aap kee Dunya) has been given back the shortwave transmissions that were dropped on 31 December: 0100-0200 on 9520 and 9820, 1400-1500 on 7440 and 9390 (Kim Andrew Elliott, *kimandrewelliott.com*)

Radio Liberty in Kyrgyz resumed SW: 1200-1230 9465 and 13755; 1500-1530 7150 and 11790 (Neven Nagy, *Cumbredx*) After being banned from local FM relays (gh)

UZBEKISTAN After abolishing its own external service, R. Tashkent, this not exactly Christian-friendly country keeps its transmitters running by selling time to the likes of Family Radio, heard at 1405 with Harold Camping intoning on 6225, scheduled 14-15; and another evangelical outfit, CVC International, at 14-20 and 00-04 on 6260, heard at the same time in Hindi.

They probably figure the ordinary listener in South Asia will never know this is coming from Uzbekistan, as there are no announcements, "This is the Family Radio transmitter leased from Uzbekistan, signing off"! Being a land-locked country, Uzbekistan obviously has no respect either for the marine band 6200+, as long as the Christians can get blamed for the intrusion (gh)

VENEZUELA A mystery transmission on 6981.5 kHz has been identified, thanks to detective work by Colombian and Venezuelan DXers, as Radio Joel 2.28 FM, in Santa Cruz de Mara, Zulia state. It's a 50 watt ham rig, but they plan to apply for a license to operate on 60 or 41 meters. It's part of this network: www.circuitoluzdelmundo.com (Santiago San Gil's blog via Al Quaglieri, *DXLD*)

At the beginning of January, I heard an interview with officials of R. Nacional de Venezuela about their own SW site at Calabozo. Antennas and transmitters were expected to be installed in mid-2009, and first on-air tests by September. Initially there will be one 100 kW transmitter to cover North America and a 50 kW on the tropical band for Venezuela and the Caribbean; no frequencies mentioned. More than forty families in the area are benefiting from being contracted to build the infrastructure (Adán González, Venezuela, *DXLD*)

[non] Aló, Presidente resumed January 11 after a two-sesquimonth hiatus, but the following week Hugo Chávez was a no-show, despite RHC firing up all the frequencies in preparation, starting around 1400 UT: 11690, 11875, 13680, 13750, 17750. 13750 is strongest here, but sometimes carries mainstream RHC programming by mistake; 11690 collides with HCJB until 1500. Depending on the whims of the mercurial mandator, show can run as late as 1900, maybe beyond on original Venezuelan TV. This preempts the daily 15-16 RNV broadcast supposed to be on 11680, which RHC may put on 11760 by mistake, as well as the 2200 broadcast instead of 11670 (gh)

Until the Next, Best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH

gaylevanhorn@monitoringtimes.com

http://mt-shortwave.blogspot.com

0040 UTC on 11765

BRAZIL: Rádio Tupi (Curitiba). Portuguese religious sermon to 0100 ID. Signal fair-good, weak on // 9564.93. Brazilians in Portuguese: **Rádio Brazil Central** 11814.98, 0050-0110 // 4985 weak.

Streaming audio www.agecom.go.gov.br/RBCAM.php. **Rádio Bandeirantes** 6089.86, 2205-2214, better on // 9645.29, 11925.23 (Brian Alexander, Mechanicsburg, PA)

Streaming audio <http://radiobandeirantes.terra.com.br/>. **Rádio Clube do Pará** 4885, 0323

Streaming/on-demand audio www.radioclubedopara.com.br/; **RD De Macapá** 4915, 0520-0536 (Joe Wood, Greenback, TN). **Rádio Record** 6150, 2337-2345 SINPO 2232 (Jim Evans, Germantown, TN)

Streaming/on-demand audio www.radiorecord.com.br. **Rádio Nove de Julho** 9820, 0959+; **Rádio Itatiaia** 5970, 2302-2309 (Arnaldo Slaen, Buenos Aires, Argentina). **Rádio Brazil Central** 4985, 0102. **Rádio Aparecida** 5035, 0110 (Robin Tancoo, Fyzabad, Trinidad, W.I.)

Streaming audio www.radioaparecida.com.br

0202 UTC on 6065

INDIA: All India Radio (Kohima). Hindi programming's focus on Indian films and music. **AIR-Thiruvananthapuram** (Hindi) 0110. **AIR-Mumbai** 4840, 0140 AIR-Panaji 11740, 0044 (Tancoo). AIR-Shillong 4970, 1546-1623 (vernacular) **AIR-Aizawl** 5050, 1526-1545* (Howard).

0255 UTC on 6889.89

ETHIOPIA: Radio Fana. Sign-on interval signal to announcements at 0258. Horn of Africa style music for threshold signal, better on // 6110. **Radio Ethiopia** 7110 (Amharic) *0259-0310 // 9704.18; 2020-2100* // 9704.18; 7165, *0659-0710 // 9556.38v drifting to 9555.93 - 9556.25 by 0710; 9704.18, 1940-2100*, good on // 7110, weak on // 5990.66. **Voice of Peace & Democracy** via **Radio Ethiopia** 7165, *0359-0430* // 9556.13v listed as Monday-Friday. (Alexander).

0300 UTC on 3396

ZIMBABWE: Radio Zimbabwe. Usual canned drums signal to "Zimbabwe Broadcasting Corporation, Radio Zimbabwe." Announcer's list of FM frequencies and detailed shortwave schedule. African hi-life music to DJ's vernacular text. Programming on 4828 not parallel (Ron Howard, Asilomar Beach, CA). Carrier on 4828 with CODAR interference (Yoder). Tentative on 3396 (vernaculars) 0120-0134 high-life music to no discernible ID at 0130 (Scott Barbour, Intervale, NH).

0431 UTC on 4904.97

CHAD: RNT Chad. Sign-on to French announcements and African tribal music. Signal weak, usually observed stronger. Subsequent logs 4904.97, 0440-0530; 2145-2233.*; 6165, 2210-2232* (Alexander). 4905, 0630-0703 Mix of French/vernacular text (Wood).

0500 UTC on 6185

MÉXICO: Radio Educación Onda Corta (XEPPM). Spanish station ID interspersed with big band renditions of Mexican folk music. Fair signal quality. Streaming/on-demand and podcast www.radioeducacion.edu.mx/. **Radio Transcontinental de América (XERTA)** 4800, 0720-0730 children's choir to ID 0726. 4800, 0805-0910 (Wood). **Rádio Universidad (XEXQ)** (presumed) 6044.93, 0235-0241. Classical orchestra music, weak but clear (Howard).

0521 UTC on 7150

RUSSIA: Voice of Russia. Good signal for segment detailing Russian seven-string guitar (Wood). Russia's **Radio Rossii** 6075, 0825-0843 via Petropavlovsk-Kamchatka; **GTRK Krasnoyarsk** 6085, 0244 (Russian) // 5935, 6075, 7200, 7320, 7345 after 0300.; **GTRK Magadan** 7320, 0210-0300, ID as "Magadan Radio" into ads, Russian songs and news (Howard). **Voice of Russia** 7125, 1832; **Deutsche Welle via Russia** 15595, 0030 (Mckenzie). **Radio Rossii** 12075, 1105-1130 (Chuck Bolland, Clewiston, FL). **VOR** (Moldova) 6245, 1810 (Bob Fraser, Belfast, ME). **VOR** 9665, 0001 (Moldova) (Tancoo). VOR

Streaming/on-demand & podcast www.vor.ru/world.html

0625 UTC on 7125

GUINEA: RTV Guinée. Afro-pops to local tribal music. Brief French talk sounding like a speech or sermon. Fair-good signal strength, weak modulation. Tentative log on 7125 at 0724 during French text and abrupt sign-off. (Alexander). 7125, 0718 (French) (Lúcio Otávio Bobrowiec, Embu, SP, Brazil/Cumbre).

0658 UTC on 7190

TUNISIA: RTV Tunisienne. Announcer with animated Arabic conversation with lady's brief supporting remarks. Sounded like a southern minister filled

with the spirit! Additional comments with a fair deal of French sprinkled in. Signal very good (Wood).

Streaming/on-demand audio www.radiotunis.com/news.html

0731 UTC on 4845

MAURITANIA: RTF Mauritanie (Noukchott). Fast paced French announcements and mentions of Mauritania. Fair signal (Wood). Monitored 0742-0753, SINPO 34433. (Bobrowiec) 4845, 2158 (Arabic) with utility interference. (Andrew Yoder/Cumbre). 4845, 2315-0010 (Arabic) SINPO 43333 (Evans) 7245, *0755 (Arabic) ID and local string music. (Dave Valko, PA/Cumbre). 4845, 0810-0843 (Arabic) (Alexander). 7245, 0930-0940 (French) (Bruce Barker, Broomhall, PA) 4845, 0035 Koran recitations (Tancoo).

Streaming audio http://wm-live.abacast.com/radio_mauritania-wm32?.wma

0945 UTC on 7245

TAJIKISTAN: Voice of Tajik. Continuous pop music to brief English announcement at 0951, followed by Tajik programming at 1000. Dramatic martial music to thundering station ID and soviet-style national anthem. Long-winded station identification by male/female host. Good signal with minor interference from 7240 and PBS Xizang signal splatter (Al Muick, Kabul, Afghanistan). **Radio Tajikistan** 4635, 0132 (Tancoo).

1229 UTC on 7250

BANGLADESH: Bangladesh Betar. Strong flute music at 1230 to opening English text and news. News was unintelligible due to weak voice modulation. Subsequent monitoring this time noted under stronger China Radio Int'l (Alexander).

On-demand audio www.betar.org.bd/

1412 UTC on 3912

CLANDESTINE: Voice of the People (presumed). Assorted chats via male/female duo to vocal music tunes. Good signal // 6517.98, 6599.98. All freqs remained good at 1503 recheck. Additional clannies: **Nippon no Kaze** via Darwin, Australia 9690, 1509-1539* (Korean) with long closing routine at 1525 including email info@rachi.go.jp website www.rachi.go.jp. Carrier off at 1530. **Aso Radio International** 15180. Popped up at 1600 with drum/flute music to ID. Presumed Hausa programming of text and website quote as www.asoradionline.com. Nice West African music as signal initially good though deteriorated after 1630, unreadable by 1655. (John Wilkins, Wheat Ridge, CO).

1607 UTC on 11615

FRANCE: Radio France International. **Music & Musicians** series. SIO 454 (Fraser). 15300, 1643, poor signal. **Radio Algeria** via **Issoundun, France** 5865, 0417-0436 in Arabic, with call to prayers and Koran (Wood).

Streaming audio www.rfi.fr/actuen/pages/001/accueil.asp

1758 UTC on 11735

ZANZIBAR: Radio Tanzania-Zanzibar. Drums to pips signal and English news to ID. Signal fair, monitored to 1809 (Howard). Audible 11735, 1809 news to "Spice FM" identification to Swahili talk and US pop tune. Audio beginning to get warbling effect after yesterday's 1800-1825 good level but poor audio (Alexander). 11735, 1802-186 (Barbour).

1827 UTC on 9330

SYRIA: Radio Damascus. Tune-in to German programming of talk, local and instrumental music. French service commencing 1900, abruptly off the air at 1931. Poor-fair signal with low modulation and audio hum (Alexander).

2235 UTC on 9705

NIGER: La Voix du Sahel. Pop music ballads to French announcements. Koran recitations at 2253. Sign-off with local flutes and national anthem at 2259. Test tones at 2301 and off. Signal weak-poor with co-channel interferences. (Alexander)

On-demand audio <http://telesahel.org/ortne/>

Additional loggings excluded for space constraints are posted as **Blog Logs** on the **Shortwave Central Blog** at the above web address.

Thanks to our contributors – Have you sent in YOUR logs?

Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.

QSL Tips and Contesting

From *Top News-Worldwide DX Club*, comes a reminder to shortwave listeners that this is the Year of the Ox in the twelve signs of the Japanese and Chinese zodiac. All correct reception reports to the Asian DX news segment in HCB DX Partyline (every fourth Saturday: 0800 on 11,750 kHz; 1230 on 15,400 kHz) will be verified with a colorful QSL card. Reports may be addressed to: JSWC c/o T. Ohake, 5-31-6 Tamanawa, Kamakura 247-0071, Japan. Please enclose one IRC for reply.

Transmitter Documentation Project (TDP), a Belgium broker leasing air time on shortwave transmitters, has added a new station to their broadcasting schedule: Voice of Meselna-Delina in the Tigrinya language, targeting programming to East Africa at 1730-1800 on 9610, Tuesday, Thursday, and Saturday. Send your reception reports to: Transmitter Documentation project (TDP), Attention: Ludo Maes-Managing Director, P.O. Box 1, B-2310 Rijkevorsel, Belgium. Email contact: info@transmitter.org. For additional information on TDP, consult their website at www.tdp.info

Brazilian broadcaster Rádio Tupi Curitiba has changed their name to Super Rádio Deus É Amor, active 24 hours on 6060, 9565, 11765 kHz. Until further notice, send your Portuguese reports with return mint postage to: Rua João Negrão 595, Centro, 80010-200, Curitiba, PR, Brasil.

Radio Prague is offering a series of eight *Czech Locomotives* for 2009. The colorful cards include six different views of steam locomotives, plus The Pullman Car and a track motor car. Cards may be viewed at www.radio.cz/en/html/qsl2009.html. Reception reports to: Czech Radio, Vinohradská 12, 12099 Prague 2, Czech Republic, or to english@radio.cz

China Radio International and the Sichuan Tourism Administration are jointly sponsoring the *Charming Sichuan* online knowledge contest. The contest, which closes on April 15, 2009, consists of 14 online

multiple choice questions about China, and all *netizens* are invited to enter. First, second and third place prizes will be awarded, the top prize includes a visit to Sichuan, China. For additional information and to view the questions, go to: <http://210.51.185.203:8080/jingsai/English/Default.aspx?language=English>

Shortwave listeners, especially those living in remote areas, and sailors based on Navy ships, have depended on Armed Forces Radio to bring the latest in sports, music, military and world news. As a reminder to our readers, AFN broadcasts on upper-sideband on the following schedule:

San Diego 12, 759 (Daytime) 4,319 (Nighttime)
Guam 13, 362 (Daytime) 5,765 (Nighttime)
Key West Florida 5,446.5; 7,812.5; 12, 133.5 (Daytime/Nighttime)
Pearl Harbor, Hawaii 10, 320 (Daytime) 6,350 (Nighttime)

Reception reports may be sent to Senior Chief Robert Winkler robert.winkler@dma.mil or qsl@dodmedia.osd.mil. Postal address: Attention: Officer in Charge, Department of Defense, Naval Media Center Detachment, AFRTS-DMC, 23755 Z Street, Bldg. 2730, Riverside, CA 92518-2017 USA.

Radio New Zealand is still offering their 60th Anniversary QSL card for correct reception reports. Online web reports are available at www.rnzi.com/pages/qsl_web.php and will be verified by email only. Postal reports should include two IRCs or \$2.00 US if a QSL is desired to: P.O. Box 123, Wellington, New Zealand.

And, in what must be a record, Wendel Craighead reported that Radio Free Asia responded within minutes to his online reception report. Director of Production Support, A.J. Janitschek, responded in eight minutes, while on vacation! Let me know if you beat his record.

For more information on Radio Free Asia, consult their website at www.rfa.org/english/ Online reception reports may be sent to QSL@rfa.org or to: Reception Report, Radio Free Asia, Suite 300, 2025 M. Street NW, Washington, DC 20036 USA.

AMATEUR RADIO

China BT1OH, RTTY, 20 meters. Full color two-sided QSL card via BA4EG in oversized envelope with beautiful Chinese stamps, plus enclosed an extra sample BT2000 QSL and business card. Received in three months/six days for an SAE, nested envelope and \$2.00US. QSL address: 552-39-502 Zao Zhuang Lu, Shanghai, China. Took 20 years to finally work China as a ham (Ken Reitz, VA).

Kazakhstan UNIL, PSK31, 40 meters. E-QSL and Log Book of the World verified in ten days for new country (Larry Van Horn, N5FPW, NC).

Scotland MM0DGR, PSK63, 20 meters. Full data receiver/Scottish livestock card. Received in 14 months via ARRL bureau (Van Horn).



ANDAMAN and NICOBAR ISLANDS

All India Radio-Port Blair 4760 kHz. Full data verification letter signed by P.P. Babby-Station Engineer. Reply received in 20 days via email to airportblair@rediffmail.com (email address on AIR website is incorrect). Original report mailed with two IRCs (Al Muick, Kabul, Afghanistan).

GERMANY

Sawtu Linjiila/Lutheran World Federation via Media Broadcast, Wertachtal, Germany transmitter. Full data verification letter, signed by Jukka-Latva Hakuni-Media Consultant, with site notation and additional program information for Fulani language broadcast. Received in 19 days via email for an email report with attached mp3 audio file. Report emailed to qsl-shortwave@media-broadcast.com Postal address: Media Broadcast GmbH, OMB Köln, Bastionstrasse 11-19, D-52428 Jülich, Germany. MB website: www.media-broadcast.com (Ed Kusalik, Alberta, Canada).

MEDIUM WAVE

Japan JOER Horoshima 1350 AM kHz. Full data QSL card with photo of tower, unsigned. Received in fourteen months. Station address: 21-3 Moto-machi, Naka-ku, Hiroshima 730-6504 Japan. Japanese QSL # 113 (Patrick Martin, Seaside, OR). CFZM 740 kHz AM. Full data Zoomer Radio

card signed by Brian Smith-QSL Manager, plus program schedules and pamphlets. Received in 67 days for an AM report and SASE (used for reply). QSL address: ODXA, 155 Main St., N. Apt. 313 Newmarket, Ontario L3Y 8C2 Canada (Bill Wilkins, Springfield, MO).

WOR, 710 AM kHz. Full data blue logo card signed by Chief Engineer. Received in 120 days for an AM report. Station address: 111 Broadway, 3rd Floor, New York, NY 10006 USA (Frank Hilton, Charleston, SC).

Streaming and on-demand audio www.wor710.com/

ROMANIA

Radio Romania International 6150. Partial data photo card of a Siberian Iris, nice letter and questionnaire. Received in 42 days for a English report. Station address: Str. General Berthelot nr., 60-64, RO 010171 Bucharest, Romania (Joe Wood, Greenback, TN).

TAJIKISTAN

Voice of Tibet via Dushanbe-Yangi Yul, 17598 kHz. Full data montage card (except site) in two months, illegible signature as Editor in Chief. QSL address: Narthnsng Building, Gangchen Kyishong, Dharamsala-176 215 H.P., India (Wendal Craighead, Prairie Village, KS).



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column below the time of broadcast, using the following codes:

Codes	
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
vl	Various languages
USB:	Upper Sideband

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before

print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
ca:	Central America
do:	domestic broadcast
eu:	Europe
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

Mode used by all stations in this guide is AM unless otherwise indicated.

MT MONITORING TEAM

Gayle Van Horn
Frequency Manager

gaylevanhorn@monitoringtimes.com

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Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D' Angelo/NASWA Flash Sheet, NASWA Journal; Rachel Baughn/MT; Arnie Coro/R Havana; Alokesh Gupta, New Delhi, India; Ivo Ivanov; Bulgaria; Jose Jacob, India; Dave Kenny, UK; Gérald Théor t-Freq Manager/RCI; Michael Puetz/Media Broadcast; Daniel Sampson, Ernest Riley/PTSW; Harold Sellers, Canada/ODXA, DX Listening-In; Tom Taylor, UK; Wolfgang Büeschel, Germany/WWDXC BC DX, Top News; AOKI; Ardic DX Club; Cumbre DX; DX Asia; British DX Club; EIBI; HFCC; Hard-Core DX; DX Mix News; World DX Club/Contact.

Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide.

**GLENN HAUSER'S
WORLD OF RADIO**
<http://www.worldofradio.com>

For the latest DX and programming news, amateur nets, DX program schedules, audio archives and much more!

0000 UTC - 7PM EST / 6PM CST / 4PM PST

0000	0000	UK, BBC World Service	5970as	6195as
		7105as	9410as	9740as
		15360as	17615as	
0000	0004	Canada, R Canada International		9755na
0000	0020	Japan, NHK World Radio Japan		5920eu
		6110na	6120na	6145na
		13650as	17810as	11705na
0000	0030	Australia, HCB Global	15410as	15525as
0000	0030	Egypt, Radio Cairo	6850na	
0000	0030	Thailand, Radio Thailand World Svc		9680na
		12095na		
0000	0030	USA, Voice of America	7405as	
0000	0045	India, All India Radio	9705as	9950as
		11620as	11645as	13605as
0000	0045	USA, WYFR/Family Radio Worldwide		6085na
0000	0057	Canada, R Canada International		9800as
0000	0057	China, China Radio International		6020na
		6075as	6180as	7130eu
		9425as	9570as	11650as
		11885as		11790as
0000	0057	Germany, Deutsche Welle	7265as	
0000	0058	Germany, Deutsche Welle	9785as	
0000	0100	Anguilla, Worldwide Univ Network		6090am
0000	0100	Australia, ABC NT Alice Springs		2310do
		4835do		
0000	0100	Australia, ABC NT Katherine	5025do	
0000	0100	Australia, ABC NT Tennant Creek		4910do
0000	0100	Australia, Radio Australia	9660as	12080as
		13690as	15240pa	17715as
		17775va	17795va	17750va
0000	0100	Bulgaria, Radio Bulgaria	5900na	7400na
0000	0100	Canada, CFRX Toronto ON	6070na	
0000	0100	Canada, CFVP Calgary AB	6030na	
0000	0100	Canada, CKZN St John's NF	6160na	
0000	0100	Canada, CKZU Vancouver BC	6160na	
0000	0100	Costa Rica, Worldwide Univ Network		5030va
		6150va	7375va	9725va
0000	0100	Germany, Deutsche Welle	15595as	
0000	0100	Guyana, Voice of Guyana	3291do	
0000	0100	Malaysia, RTM/Traxx FM	7295as	
0000	0100	New Zealand, Radio NZ International		17675pa
0000	0100	New Zealand, Radio NZ International		15720pa
0000	0100	Papua New Guinea, Wantok R. Light		7325va
0000	0100	Spain, Radio Exterior Espana	6055na	
0000	0100	USA, Armed Forces Radio Network		4319usb
		5446usb	5765usb	6350usb
		10320usb	12132usb	13362usb
0000	0100	USA, WBCQ Monticello ME	5110am	
0000	0100	USA, WBCQ Monticello ME	7415am	
0000	0100	USA, WBOH Newport NC	5920am	
0000	0100	USA, WEWN Vandiver AL	11520af	
0000	0100	USA, WHRA Greenbush ME	5850eu	
0000	0100	USA, WHRI Cypress Creek SC	5875na	7315sa
		7385na		
0000	0100	USA, WINB Red Lion PA	9265am	
0000	0100	USA, WRMI Miami FL	9955am	
0000	0100	USA, WTJC Newport NC	9370na	
0000	0100	USA, WWCR Nashville TN	5070na	7465na
		9980na		
0000	0100	USA, WWRB Manchester TN	3185va	5050na
		5745va	6890va	
0000	0100	USA, WYFR/Family Radio Worldwide		5950na
		9505na	11720sa	15440am
0000	0100	Zambia CVC/ The Voice Africa	4965af	
0005	0100	Canada, R Canada International		9755na
0005	0100	Greece, Voice of Greece	7475eu	9420eu
0030	0045	Germany, Pan American BC	9640as	
0030	0100	Australia, Radio Australia	15415as	
0030	0100	China, China Radio International		11730as
0030	0100	UK, Bible Voice BC	6030as	
0030	0100	USA, Voice of America	7405va	9325va
		9620va	9715va	11695va
		15185va	15205va	15290va
0030	0100	Uzbekistan, CVC International	7395as	

0100 UTC - 8PM EST / 7PM CST / 5PM PST

0100	0104	Canada, R Canada International		9755na
0100	0127	China, China Radio International		11730as
0100	0127	Czech Rep, Radio Prague	6200na	7345na
0100	0127	Slovakia, R Slovakia International		7230na
		9440sa		
0100	0128	Serbia, Intl Raido Serbia	6190na	
0100	0128	Vietnam, Voice of Vietnam	6175na	
0100	0130	Australia, Radio Australia	9660as	12080as

0100	0155	Turkey, Voice of Turkey	6165am	
0100	0156	Romania, R Romania International		6145na
		9515na		
0100	0157	China, China Radio International		6080na
0100	0157	China, China Radio International		6005na
		6020na	6075as	7180as
		9410na	9570na	9580as
		11885as		
0100	0158	New Zealand, Radio NZ International		17675pa
0100	0159	Canada, R Canada International		5840va
		6165as	7255as	
0100	0200	Anguilla, Worldwide Univ Network		6090am
0100	0200	Australia, ABC NT Katherine	5025do	
0100	0200	Australia, ABC NT Tennant Creek		4910do
0100	0200	Australia, HCB Global	15410as	
0100	0200	Canada, CFRX Toronto ON	6070na	
0100	0200	Canada, CFVP Calgary AB	6030na	
0100	0200	Canada, CKZN St John's NF	6160na	
0100	0200	Canada, CKZU Vancouver BC	6160na	
0100	0200	Costa Rica, Worldwide Univ Network		5030va
		6150va	7375va	9725va
0100	0200	Cuba, Radio Havana Cuba	6000na	6060na
		6140na		
0100	0200	Guyana, Voice of Guyana	3291do	
0100	0200	Malaysia, RTM/Traxx FM	7295as	
0100	0200	New Zealand, Radio NZ International		15720pa
0100	0200	North Korea, Voice of Korea	7140as	9345as
		9730as	11735am	13760am
0100	0200	Palau, T8WH/World Harvest	15680as	
0100	0200	Papua New Guinea, Wantok R. Light		7325va
0100	0200	Sri Lanka, SLBC	6005as	9770as
0100	0200	Taiwan, R Taiwan International	11875as	
0100	0200	UK, BBC World Service	5940va	5970as
		9410as	7105as	7410me
		11955as	15310as	15335as
		17615as		15360as
0100	0200	Ukraine, R Ukraine International		7440na
0100	0200	USA, Armed Forces Radio Network		4319usb
		5446usb	5765usb	6350usb
		10320usb	12133usb	13362usb
0100	0200	USA, Voice of America	7325va	9435va
		11705va		
0100	0200	USA, WBCQ Monticello ME	5110am	
0100	0200	USA, WBCQ Monticello ME	7415am	
0100	0200	USA, WBOH Newport NC	5920am	
0100	0200	USA, WEWN Vandiver AL	11520af	
0100	0200	USA, WHRA Greenbush ME	5850eu	
0100	0200	USA, WHRI Cypress Creek SC	5875na	7315sa
		7385na		
0100	0200	USA, WINB Red Lion PA	9265am	
0100	0200	USA, WRMI Miami FL	9955am	
0100	0200	USA, WTJC Newport NC	9370na	
0100	0200	USA, WWCR Nashville TN	5070na	7465na
		9980na		
0100	0200	USA, WWRB Manchester TN	3185va	5050na
		5745va	6890va	
0100	0200	USA, WYFR/Family Radio Worldwide		5950na
		7455na	9505na	15195as
0100	0200	Uzbekistan, CVC International	7395as	
0100	0200	Zambia CVC/ The Voice Africa	4965af	
0105	0200	Canada, R Canada International		9755na
0130	0145	Albania, Radio Tirana	7425na	
0130	0200	Australia, Radio Australia	9660as	12080as
		13690as	15240pa	15415as
		17750va	17795va	17715as
0130	0200	Iran, VOIRI/IRIB	6120na	7160na
0130	0200	USA, Voice of America	5960va	7405va
0145	0200	United Arab Emirates, FEBA	6140af	

0200 UTC - 9PM EST / 8PM CST / 6PM PST

0200	0204	Canada, R Canada International		9755na
0200	0227	Czech Rep, Radio Prague	6200na	7345na
0200	0227	Iran, VOIRI/IRIB	6120na	7160na
0200	0228	Serbia, Intl Raido Serbia	6190na	
0200	0230	Uzbekistan, CVC International	7395as	
0200	0257	China, China Radio International		11770as
		13640as		
0200	0258	Lithuania, Mighty KBC Radio	6110na	
0200	0300	Anguilla, Worldwide Univ Network		6090am
0200	0300	Argentina, RAE	15345va	
0200	0300	Australia, ABC NT Alice Springs		2310do
		4835do		
0200	0300	Australia, ABC NT Katherine	5025do	
0200	0300	Australia, ABC NT Tennant Creek		4910do
0200	0300	Australia, HCB Global	15410as	

0200	0300	Australia, Radio Australia	9660as	12080as	
		13690as	15240pa	15415as	15515as
		17750va	21725va		
0200	0300	Canada, CFRX Toronto ON	6070na		
0200	0300	Canada, CFVP Calgary AB	6030na		
0200	0300	Canada, CKZN St John's NF	6160na		
0200	0300	Canada, CKZU Vancouver BC	6160na		
0200	0300	Costa Rica, Worldwide Univ Network	5030va		
		6150va	7375va		
0200	0300	Cuba, Radio Havana Cuba	6000na	6060na	
		6140na			
0200	0300	Egypt, Radio Cairo	7535na		
0200	0300	Guyana, Voice of Guyana	3291do		
0200	0300	Indonesia, Voice of Indonesia	9526va	11784al	
0200	0300	Malaysia, RTM/Traxx FM	7295as		
0200	0300	DRM New Zealand, Radio NZ International	17675pa		
0200	0300	New Zealand, Radio NZ International	15720pa		
0200	0300	North Korea, Voice of Korea	13650as	15100as	
0200	0300	Palau, T8WH/World Harvest	15680as		
0200	0300	vi Papua New Guinea, Wantok R. Light	7325va		
0200	0300	Philippines, Radyo Pilipinas	11880va	15285va	
		17710va			
0200	0300	Russia, Voice of Russia	6100na	6240na	
		7250na	12040na	13735na	
0200	0300	South Korea, KBS World Radio	9580sa		
0200	0300	Sri Lanka, SLBC	6005as	9770as	15745as
0200	0300	Taiwan, R Taiwan International	5950na		
0200	0300	Thailand, Radio Thailand World Svc	15275na		
0200	0300	UK, BBC World Service	6005af	6195me	
		15310as			
0200	0300	USA, Armed Forces Radio Network	4319usb		
		5446usb	5765usb	6350usb	7811usb
		10320usb	12133usb	13362usb	
0200	0300	USA, KJES Vado NM	7555na		
0200	0300	USA, KJES Vado NM	7555na		
0200	0300	smt USA, WBCQ Monticello ME	7415am		
0200	0300	m USA, WBCQ Monticello ME	5110am		
0200	0300	USA, WBOH Newport NC	5920am		
0200	0300	USA, WEWN Vandiver AL	11520af		
0200	0300	USA, WHRA Greenbush ME	5850eu		
0200	0300	USA, WHRI Cypress Creek SC	5875na	7315sa	
		7490na			
0200	0300	USA, WINB Red Lion PA	9265am		
0200	0300	USA, WRMI Miami FL	9955am		
0200	0300	USA, WTJC Newport NC	9370na		
0200	0300	USA, WWCR Nashville TN	3215na	5070na	
		5890na			
0200	0300	USA, WWRB Manchester TN	3185va	5050na	
		5745va	6890va		
0200	0300	USA, WYFR/Family Radio Worldwide	5985sa		
		7455na	9505na	9525am	11855sa
0215	0230	Nepal, Radio Nepal	5005as		
0230	0257	China, China Radio International	15435me		
0230	0258	Vietnam, Voice of Vietnam	6175ca		
0230	0300	Malaysia, RTM/Voice of Malaysia	15295pa		
0230	0300	Netherlands, R Netherlands Worldwide	11550as		
0230	0300	South Korea, KBS World Radio	9560na		
0230	0300	Sweden, Radio Sweden	6010na	11550va	
0230	0300	Uzbekistan, CVC International	11650as		
0245	0300	twhf Albania, Radio Tirana	7390na		
0245	0300	Myanmar, Myanma Radio	9731do		
0250	0300	Vatican City, Vatican Radio	6040am	7305na	
0255	0300	vi Rwanda, Radio Rwanda	6055do		

0300 UTC - 10PM EST / 9PM CST / 7PM PST

0300	0315	Croatia, Voice of Croatia	3985eu	7375va	
0300	0320	Vatican City, Vatican Radio	6040am	7305na	
0300	0330	Egypt, Radio Cairo	7535na		
0300	0330	Myanmar, Myanma Radio	9731do		
0300	0330	Philippines, Radyo Pilipinas	11880va	15285va	
		17710va			
0300	0330	Sri Lanka, SLBC	6005as	9770as	15745as
0300	0330	USA, KJES Vado NM	7555na		
0300	0330	Vatican City, Vatican Radio	7360af	9660af	
0300	0357	China, China Radio International	6190na		
		9460as	9690na	11770as	13620as
		15110as	15120as		
0300	0358	Germany, Deutsche Welle	9800as		
0300	0359	Germany, Deutsche Welle	13810as		
0300	0400	Anguilla, Worldwide Univ Network	6090am		
0300	0400	Australia, ABC NT Alice Springs	2310do		
		4835do			
0300	0400	Australia, ABC NT Katherine	5025do		
0300	0400	Australia, ABC NT Tennant Creek	4910do		
0300	0400	Australia, Radio Australia	9660as	12080as	
		13690as	15240pa	15415as	15515as
		17750va	21725va		

0300	0400	Bulgaria, Radio Bulgaria	5900na	7400na	
0300	0400	Canada, CBC NQ SW Service	9625na		
0300	0400	Canada, CFRX Toronto ON	6070na		
0300	0400	Canada, CFVP Calgary AB	6030na		
0300	0400	Canada, CKZN St John's NF	6160na		
0300	0400	Canada, CKZU Vancouver BC	6160na		
0300	0400	Costa Rica, Worldwide Univ Network	5030va		
		6150va	7375va	9725va	
0300	0400	Cuba, Radio Havana Cuba	6000na	6060na	
		6140na			
0300	0400	Guyana, Voice of Guyana	3291do		
0300	0400	Malaysia, RTM/Traxx FM	7295as		
0300	0400	Malaysia, RTM/Voice of Malaysia	6175as		
		9750as	15295as		
0300	0400	New Zealand, Radio NZ International	15720pa		
0300	0400	DRM New Zealand, Radio NZ International	17675pa		
0300	0400	North Korea, Voice of Korea	7140as	9345as	
		9730as			
0300	0400	Oman, Radio Oman	15355as		
0300	0400	Palau, T8WH/World Harvest	15680as		
0300	0400	vi Papua New Guinea, Wantok R. Light	7325va		
0300	0400	Russia, Voice of Russia	6100na	6155na	
		6240na	7340na	7350na	12040na
		13735na			
0300	0400	vi Rwanda, Radio Rwanda	6055do		
0300	0400	South Africa, Channel Africa	3345af	7390af	
0300	0400	Taiwan, R Taiwan International	5950na	15215sa	
		15320as			
0300	0400	UK, BBC World Service	3255af	6005af	
		6145af	6190af	6195me	6245af
		7255af	7375af	9410me	9750af
		11760va	15310as	17790as	
0300	0400	USA, Armed Forces Radio Network	4319usb		
		5446usb	5765usb	6350usb	7811usb
		10320usb	12133usb	13362usb	
0300	0400	USA, Voice of America	4930af	6080af	
		9885af	15580af		
0300	0400	USA, WBCQ Monticello ME	7415am		
0300	0400	m USA, WBCQ Monticello ME	5110am		
0300	0400	USA, WBCQ Monticello ME	9330am		
0300	0400	USA, WBOH Newport NC	5920am		
0300	0400	USA, WEWN Vandiver AL	9455af		
0300	0400	USA, WHRA Greenbush ME	5850eu		
0300	0400	USA, WHRI Cypress Creek SC	5875na	7315sa	
		7385va			
0300	0400	USA, WRMI Miami FL	9955am		
0300	0400	USA, WTJC Newport NC	9370na		
0300	0400	USA, WWCR Nashville TN	3215na	5070na	
		5890na			
0300	0400	USA, WWRB Manchester TN	3185va	5050na	
		5745va	6890va		
0300	0400	USA, WYFR/Family Radio Worldwide	7455na		
		9505na	9985sa	13615sa	
0300	0400	Uzbekistan, CVC International	11650as		
0300	0400	Zambia CVC/ The Voice Africa	4965af		
0330	0358	Vietnam, Voice of Vietnam	6175ca		
0330	0400	twhf Albania, Radio Tirana	6110na		
0330	0400	Sweden, Radio Sweden	6010na		
0330	0400	UK, BBC World Service	11945af		

0400 UTC - 11PM EST / 10PM CST / 8PM PST

0400	0427	Czech Rep, Radio Prague	6080na	6200na	
		7345na			
0400	0430	Australia, Radio Australia	9660as	12080as	
		13690as	15240pa	15515as	17750va
		21725va			
0400	0430	mtwhf France, Radio France International	7315af		
		9805af			
0400	0430	Netherlands, R Netherlands Worldwide	9575af		
0400	0430	Uzbekistan, CVC International	11650as		
0400	0445	USA, WYFR/Family Radio Worldwide	7455na		
		9505na			
0400	0455	Turkey, Voice of Turkey	6020am	7240va	
		7325na			
0400	0456	Romania, R Romania International	6115na		
		9515na	9690as	11895as	
0400	0457	China, China Radio International	6190na		
		9590as	13650as	15120as	17725as
0400	0457	Germany, Deutsche Welle	5945af		
0400	0458	Germany, Deutsche Welle	15600af		
0400	0458	DRM New Zealand, Radio NZ International	15720pa		
0400	0458	New Zealand, Radio NZ International	17675pa		
0400	0459	Germany, Deutsche Welle	5905af		
0400	0500	Anguilla, Worldwide Univ Network	6090am		
0400	0500	Australia, ABC NT Alice Springs	2310do		
		4835do			
0400	0500	Australia, ABC NT Katherine	5025do		

0400	0500		Australia, ABC NT Tennant Creek	4910do
0400	0500	twhf	Canada, CBC NQ SW Service	9625na
0400	0500		Canada, CFRX Toronto ON	6070na
0400	0500		Canada, CKZN St John's NF	6160na
0400	0500		Canada, CKZU Vancouver BC	6160na
0400	0500		Costa Rica, Worldwide Univ Network	5030va
			6150va 7375va 9725va	
0400	0500		Cuba, Radio Havana Cuba	6000na
			6140na	6060na
0400	0500		Germany, Deutsche Welle	6180af
0400	0500		Guyana, Voice of Guyana	3291do
0400	0500		Malaysia, RTM/Traxx FM	7295as
0400	0500		Malaysia, RTM/Voice of Malaysia	6175as
			9750as 15295as	
0400	0500		Netherlands, R Netherlands Worldwide	12080af
0400	0500		Palau, T8WH/World Harvest	15680as
0400	0500	vl	Papua New Guinea, Wantok R. Light	7325va
0400	0500		Russia, Voice of Russia	6135na
			6240na 7335na 7250na	6155na
			9855na 12030na	9840na
0400	0500	DRM	Russia, Voice of Russia	15735as
0400	0500	vl	Rwanda, Radio Rwanda	6055do
0400	0500		South Africa, Channel Africa	7230af
0400	0500	vl	Uganda, UBC Radio	4976do
0400	0500		UK, BBC World Service	3255af
			6005af 6190af 7255af	9410me
			9650af 11945af 12035af	15310as
			15360me 17790as	
0400	0500		Ukraine, R Ukraine International	7440eu
0400	0500		USA, Armed Forces Radio Network	4319usb
			5446usb 5765usb 6350usb	7811usb
			10320usb 12133usb 13362usb	
0400	0500		USA, Voice of America	4930af
			6080af 9885af 15580af	4960af
0400	0500	stwhfa	USA, WBCQ Monticello ME	7415am
0400	0500		USA, WBCQ Monticello ME	9330am
0400	0500		USA, WBOH Newport NC	5920am
0400	0500		USA, WEWN Vandiver AL	9455af
0400	0500		USA, WHRA Greenbush ME	5850eu
0400	0500		USA, WHRI Cypress Creek SC	5875na
			7385va	7315sa
0400	0500		USA, WRMI Miami FL	9955am
0400	0500		USA, WTJC Newport NC	9370na
0400	0500		USA, WWCR Nashville TN	3215na
			5890na	5070na
0400	0500		USA, WWRB Manchester TN	3185va
			5745va 6890va	5050na
0400	0500		USA, WYFR/Family Radio Worldwide	5950am
			6915na 9680na	
0400	0500		Zambia CVC/ The Voice Africa	4965af
0430	0457		Czech Rep, Radio Prague	9855af
0430	0500	twhf	Albania, Radio Tirana	6100na
0430	0500		Australia, Radio Australia	9660as
			13690as 15240pa 15415as	12080as
			17750va 21725va	15515as
0430	0500		Nigeria, Radio Nigeria/Kaduna	6090do
0430	0500	mtwhf	Swaziland, TWR	3200af
0430	0500		Uzbekistan, CVC International	155610as
0459	0500		New Zealand, Radio NZ International	11725pa
0459	0500	DRM	New Zealand, Radio NZ International	11675pa

0500 UTC - 12AM EST / 11PM CST / 9PM PST

0500	0507	twhf	Canada, CBC NQ SW Service	9625na
0500	0530		Australia, Radio Australia	9660as
			13690as 15160as 15240pa	12080as
			17750va	15515as
0500	0530	mtwhf	France, Radio France International	9805af
			11995af	
0500	0530		Germany, Deutsche Welle	6180af
			9755af 12045af 15600af	7285af
0500	0530		Japan, NHK World Radio Japan	5975eu
			6110na 9770af 9875as	15325as
0500	0530	twhf	USA, WBCQ Monticello ME	7415am
0500	0530		Vatican City, Vatican Radio	7360af
			11625af	9660af
0500	0557		China, China Radio International	5960na
			6190na 7220na 11880as	15350as
			15465va 17505as 17725as	17855as
0500	0600		Anguilla, Worldwide Univ Network	6090am
0500	0600		Australia, ABC NT Alice Springs	2310do
			4835do	
0500	0600		Australia, ABC NT Katherine	5025do
0500	0600		Australia, ABC NT Tennant Creek	4910do
0500	0600		Bhutan, Bhutan Broadcasting Svc	6035as
0500	0600		Canada, CFRX Toronto ON	6070na
0500	0600		Canada, CKZN St John's NF	6160na

0500	0600		Canada, CKZU Vancouver BC	6160na
0500	0600		Costa Rica, Worldwide Univ Network	5030va
			6150va 7375va 9725va	
0500	0600		Cuba, Radio Havana Cuba	6000na
			6140na	6060na
0500	0600		Guyana, Voice of Guyana	3291do
0500	0600		Iran, VOIR/IRIB	6120na
0500	0600		Kuwait, Radio Kuwait	15110va
0500	0600		Malaysia, RTM/Traxx FM	7295as
0500	0600		Malaysia, RTM/Voice of Malaysia	6175as
			9750as 15295as	
0500	0600		New Zealand, Radio NZ International	11725pa
0500	0600	DRM	New Zealand, Radio NZ International	11675pa
0500	0600		Nigeria, Radio Nigeria/Kaduna	4770do
0500	0600		Palau, T8WH/World Harvest	15680as
0500	0600	vl	Papua New Guinea, Wantok R. Light	7325va
0500	0600		Russia, Voice of Russia	6135na
			7350na 9840na	7335na
				12030na
0500	0600	DRM	Russia, Voice of Russia	15735as
0500	0600		South Africa, Channel Africa	7230af
0500	0600		Swaziland, TWR	3200af
0500	0600		Swaziland, TWR	3200af
0500	0600	vl	Uganda, UBC Radio	4976do
0500	0600		UK, BBC World Service	3255af
			6190af 7255af 9410me	5026do
			11945af 12095eu 15310as	6005af
			15420af 17640af 17790as	11765af
0500	0600	DRM	UK, BBC World Service	3995af
0500	0600		USA, Armed Forces Radio Network	4319usb
			5446usb 5765usb 6350usb	7811usb
			10320usb 12133usb 13362usb	
0500	0600		USA, Voice of America	4930af
			9885af 15580af	6080af
0500	0600		USA, WBOH Newport NC	5920am
0500	0600		USA, WEWN Vandiver AL	9455af
0500	0600		USA, WHRA Greenbush ME	7465va
0500	0600	mtwhf	USA, WHRI Cypress Creek SC	7315sa
0500	0600	Sat/Sun	USA, WHRI Cypress Creek SC	11565pa
0500	0600		USA, WHRI Cypress Creek SC	5875na
0500	0600		USA, WRMI Miami FL	9955am
0500	0600		USA, WTJC Newport NC	9370na
0500	0600		USA, WWCR Nashville TN	3215na
			5890na	5070na
0500	0600		USA, WWRB Manchester TN	3185va
0500	0600		USA, WYFR/Family Radio Worldwide	5950na
			6915na 9680na	
0500	0600		Uzbekistan, CVC International	15610as
0500	0600		Zambia CVC/ The Voice Africa	4965af
0515	0530	vl	Rwanda, Radio Rwanda	6055do
0530	0600		Australia, Radio Australia	9660as
			13690as 15160as 15240pa	12080as
			15515as 17750va	15415as
0530	0600	vl	Rwanda, Radio Rwanda	6055do
0530	0600		Thailand, Radio Thailand World Svc	11730va

0600 UTC - 1AM EST / 12AM CST / 10PM PST

0600	0615	Sat/Sun	South Africa, Trans World Radio	11640af
0600	0629		Germany, Deutsche Welle	7240af
0600	0630	Sat/Sun	Australia, Radio Australia	15180as
0600	0630		Australia, Radio Australia	9660as
			12080as 13690as 15160as	15240pa
			15515as 17750va	
0600	0630	mtwhf	France, Radio France International	7315af
			11995af 13680af 15160af	
0600	0630		Germany, Deutsche Welle	12045af
0600	0630		Nigeria, Radio, National Svc/Abuja	7275do
0600	0630		Vatican City, Vatican Radio	4005eu
			7250eu	5965eu
0600	0645	mtwhf	South Africa, Trans World Radio	11640af
0600	0657		China, China Radio International	16115na
			11750af 11880as 13645as	15145me
			15350as 15465as 17505va	17540as
			17710as 17770me	
0600	0658		New Zealand, Radio NZ International	11725pa
0600	0658	DRM	New Zealand, Radio NZ International	11675pa
0600	0700		Anguilla, Worldwide Univ Network	6090am
0600	0700		Australia, ABC NT Alice Springs	2310do
			4835do	
0600	0700		Australia, ABC NT Katherine	5025do
0600	0700		Australia, ABC NT Tennant Creek	4910do
0600	0700		Canada, CFRX Toronto ON	6070na
0600	0700		Canada, CFVP Calgary AB	6030na
0600	0700		Canada, CKZN St John's NF	6160na
0600	0700		Canada, CKZU Vancouver BC	6160na
0600	0700		Costa Rica, Worldwide Univ Network	5030va
			6150va 7375va 9725va	11870va
0600	0700		Cuba, Radio Havana Cuba	6000na
				6060na

0600	0700	6140na		
0600	0700	Guyana, Voice of Guyana	3291do	
0600	0700	Kuwait, Radio Kuwait	15110va	
0600	0700	Malaysia, RTM/Traxx FM	7295as	
0600	0700	Malaysia, RTM/Voice of Malaysia	6175as	
		9750as	15295as	
0600	0700	Nigeria, Radio Nigeria/Kaduna	4770do	
0600	0700	Papua New Guinea, Wantok R. Light	7325va	
0600	0700	Russia, Voice of Russia	17665pa	17805pa
0600	0700	South Africa, Channel Africa	7230af	15255af
0600	0700	UK, BBC World Service	6005af	6190af
		7255af	9410af	9860af
		11765af	15310as	15420af
		17790as	17640af	
0600	0700	UK, BBC World Service	3995af	
0600	0700	Ukraine, R Ukraine International	7440eu	
0600	0700	USA, Armed Forces Radio Network	4319usb	
		5446usb	5765usb	6350usb
		10320usb	12133usb	13362usb
0600	0700	USA, Voice of America	6080af	9885af
		15580af		
0600	0700	USA, WBOH Newport NC	5920am	
0600	0700	USA, WEWN Vandiver AL	9455af	
0600	0700	USA, WHRA Greenbush ME	7465va	
0600	0700	USA, WHRI Cypress Creek SC	7315sa	
0600	0700	USA, WHRI Cypress Creek SC	11565pa	
0600	0700	USA, WHRI Cypress Creek SC	7385va	
0600	0700	USA, WRMI Miami FL	9955am	
0600	0700	USA, WTJC Newport NC	9370na	
0600	0700	USA, WWCN Nashville TN	3215na	5070na
		5890na		
0600	0700	USA, WWRB Manchester TN	3185va	
0600	0700	USA, WYFR/Family Radio Worldwide	5745eu	
		6000sa	9680na	11530eu
				11580af
0600	0700	Uzbekistan, CVC International	15610as	
0600	0700	Vanuatu, Radio Vanatu	7260do	
0600	0700	Zambia CVC/ The Voice Africa	6065af	13590af
0630	0656	Romania, R Romania International	7180eu	
		9690eu	15560pa	17780pa
0630	0700	Australia, Radio Australia	9660as	11650as
		12080as	13690as	15160as
		15415as	15515as	17750va
0630	0700	Vatican City, Vatican Radio	7360af	9660af
		11625af		
0659	0700	New Zealand, Radio NZ International	9765pa	
0659	0700	New Zealand, Radio NZ International	9870pa	

0700 UTC - 2AM EST / 1AM CST / 11PM PST

0700	0703	vl	Croatia, Voice of Croatia	6165eu	9470pa
			11690pa		
0700	0706		UK, BBC World Service	6005af	
0700	0727		Slovakia, R Slovakia International	13715va	
			15460va		
0700	0730		France, Radio France International	11725af	
			15605af		
0700	0730	mtwhf	UK, BBC World Service	15575as	
0700	0745		USA, WYFR/Family Radio Worldwide	5745eu	
0700	0757		China, China Radio International	11785eu	
			11880as	15125as	15350as
			17540as		
0700	0800		Anguilla, Worldwide Univ Network	6090am	
0700	0800		Australia, ABC NT Alice Springs	2310do	
			4835do		
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Creek	4910do	
0700	0800		Australia, Radio Australia	9475as	9660as
			9710as	11650as	11945as
			13630pa	15160va	15240pa
0700	0800		Bhutan, Bhutan Broadcasting Svc	6035as	
0700	0800		Canada, CFRX Toronto ON	6070na	
0700	0800		Canada, CFVP Calgary AB	6030na	
0700	0800		Canada, CKZN St John's NF	6160na	
0700	0800		Canada, CKZU Vancouver BC	6160na	
0700	0800		Costa Rica, Worldwide Univ Network	5030va	
			6150va	7375va	9725va
					11870va
0700	0800	DRM	Germany, Deutsche Welle	5990eu	
0700	0800		Guyana, Voice of Guyana	3291do	
0700	0800		Kuwait, Radio Kuwait	15110va	
0700	0800	Sat	Latvia, Radio SWH	9290eu	
0700	0800		Liberia, Star Radio	9525af	
0700	0800		Malaysia, RTM/Traxx FM	7295as	
0700	0800		Malaysia, RTM/Voice of Malaysia	6175as	
			9750as	15295as	
0700	0800		Myanmar, Myanma Radio	9731do	
0700	0800		New Zealand, Radio NZ International	9765pa	
0700	0800	DRM	New Zealand, Radio NZ International	9870pa	
0700	0800		Nigeria, Radio Nigeria/Kaduna	4770do	

0700	0800		Palau, T8WH/World Harvest	9930as	15680as
0700	0800	vl	Papua New Guinea, R East New Britain	3385do	
0700	0800	vl	Papua New Guinea, Wantok R. Light	7325va	
0700	0800	DRM	Russia, Voice of Russia	11635eu	
0700	0800		Russia, Voice of Russia	17665pa	17805pa
0700	0800	vl	Solomon Islands, SIBC	5020do	
0700	0800	vl	South Africa, Channel Africa	9625af	
0700	0800		UK, BBC World Service	6190af	9860af
			11760me	11765af	15310as
			15420af	17790as	17830af
0700	0800	Sat	UK, Bible Voice BC	5945eu	
0700	0800		USA, Armed Forces Radio Network	4319usb	
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Vandiver AL	9455af	
0700	0800	mtwhf	USA, WHRI Cypress Creek SC	7315sa	11565va
0700	0800	Sat/Sun	USA, WHRI Cypress Creek SC	5875va	11565va
0700	0800		USA, WHRI Cypress Creek SC	7385na	
0700	0800		USA, WRMI Miami FL	9955am	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCN Nashville TN	3215na	5070na
			5890na		
0700	0800		USA, WWRB Manchester TN	3185va	
0700	0800		USA, WYFR/Family Radio Worldwide	6915na	
			7455na	9495sa	9715am
0700	0800		Uzbekistan, CVC International	15610as	
0700	0800	vl	Vanuatu, Radio Vanatu	7260do	
0700	0800		Zambia CVC/ The Voice Africa	6065af	13590af
0730	0745		Vatican City, Vatican Radio	4005eu	5965eu
			7250eu	9645eu	11740eu
					15595eu
0730	0800		Australia, HCJB Global	11750pa	
0730	0800		Bulgaria, Radio Bulgaria	5900eu	7400eu
0730	0800	Sat/Sun	UK, BBC World Service	15575as	
0745	0800	Sun	Germany, TWR-Europe	6105eu	
0745	0800	Sun	Monaco, TWR-Europe	9800eu	
0750	0800		Saudi Arabia, BSKSA	17785as	

0800 UTC - 3AM EST / 2AM CST / 12AM PST

0800	0815	Sat	Guam, KTWR/TWR	11840pa	
0800	0815	Sat	UK, Bible Voice BC	5945eu	
0800	0825		Malaysia, RTM/Voice of Malaysia	6175as	
			9750as	15295as	
0800	0827		Czech Rep, Radio Prague	7345eu	9860eu
0800	0830		Australia, ABC NT Katherine	5025do	
0800	0830		Australia, ABC NT Tennant Creek	4910do	
0800	0830		Myanmar, Myanma Radio	9731do	
0800	0835	mtwhf	Guam, KTWR/TWR	11840pa	
0800	0845		USA, WYFR/Family Radio Worldwide	9985af	
0800	0850	mtwhf	Germany, TWR-Europe	6105eu	
0800	0850	mtwhf	Monaco, TWR-Europe	9800eu	
0800	0857		China, China Radio International	9415as	
			11785eu	11880as	15350as
			15625va	17490eu	17540as
0800	0900		Anguilla, Worldwide Univ Network	6090am	
0800	0900		Australia, ABC NT Alice Springs	2310do	
			4835do		
0800	0900		Australia, HCJB Global	11750pa	
0800	0900		Australia, Radio Australia	5995as	9475as
			9580va	9590as	9710as
			12080as	13630pa	11945pa
0800	0900		Bhutan, Bhutan Broadcasting Svc	6035as	
0800	0900		Canada, CFRX Toronto ON	6070na	
0800	0900		Canada, CFVP Calgary AB	6030na	
0800	0900		Canada, CKZN St John's NF	6160na	
0800	0900		Canada, CKZU Vancouver BC	6160na	
0800	0900		Costa Rica, Worldwide Univ Network	5030va	
			6150va	7375va	9725va
0800	0900	DRM	Germany, Deutsche Welle	9610eu	
0800	0900	Sun	Germany, TWR-Europe	6105eu	
0800	0900		Guyana, Voice of Guyana	3291do	
0800	0900		Malaysia, RTM/Traxx FM	7295as	
0800	0900	Sun	Monaco, TWR-Europe	9800eu	
0800	0900		New Zealand, Radio NZ International	9765pa	
0800	0900	DRM	New Zealand, Radio NZ International	9870pa	
0800	0900		Nigeria, Radio Nigeria/Kaduna	4770do	
0800	0900		Nigeria, Voice of Nigeria/Lagos	9690af	
0800	0900		Palau, T8WH/World Harvest	9930as	15680as
0800	0900	vl	Papua New Guinea, R East New Britain	3385do	
0800	0900	vl	Papua New Guinea, Wantok R. Light	7325va	
0800	0900		Russia, Voice of Russia	15195as	17665pa
			17805pa		
0800	0900	vl	Solomon Islands, SIBC	5020do	
0800	0900	vl	South Africa, Channel Africa	9625af	
0800	0900	Sun	South Africa, SA Radio League	7205af	17860af
0800	0900		South Korea, KBS World Radio	9570as	
0800	0900		UK, BBC World Service	6190af	9860af

			11760me	15310as	15400af	17640as
0800	0900	Sat/Sun	UK, BBC World Service	17790af	21470af	
0800	0900	Sun	UK, Bible Voice BC 5945eu		15575me	
0800	0900		USA, Armed Forces Radio Network			4319usb
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
0800	0900		USA, KNLS Anchor Point AK	9615as		
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Vandiver AL	9455af		
0800	0900	mtwhf	USA, WHRI Cypress Creek SC	7315sa	11565va	
0800	0900	Sat/Sun	USA, WHRI Cypress Creek SC	5875va	11565pa	
0800	0900		USA, WHRI Cypress Creek SC	7385na		
0800	0900		USA, WRMI Miami FL	9955am		
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN	3215na	5070na	

			5890na			
0800	0900		USA, WWRB Manchester TN	3185va		
0800	0900		USA, WYFR/Family Radio Worldwide		5950am	
			6915na	7455na		
0800	0900		Uzbekistan, CVC International	15610as		
0800	0900	vl	Vanuatu, Radio Vanatu	7260do		
0800	0900		Zambia CVC/ The Voice Africa	6065af	13590af	
0805	0900	thf	Guam, KTW/TWR	15170as		
0815	0850	Sat	Germany, TWR-Europe	6105eu		
0815	0850	Sat	Monaco, TWR-Europe	9800eu		
0815	0900	f	UK, Bible Voice BC 5945eu			
0820	0900	w	Guam, KTW/TWR	15170as		
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek		2325do	
0835	0900	m	Guam, KTW/TWR	15170as		

0900 UTC - 4AM EST / 3AM CST / 1AM PST

0900	0915	Sun	UK, Bible Voice BC 5945eu			
0900	0920	Sun	Germany, TWR-Europe	6105eu		
0900	0920	Sun	Monaco, TWR-Europe	9800eu		
0900	0930		Australia, HCJB Global	11750pa		
0900	0930		Japan, NHK World Radio Japan		9625va	
			9825pa	11815as	15590as	17810as
0900	0930		Uzbekistan, CVC International	15610as		
0900	0957		China, China Radio International		9415as	
			15210pa	15270eu	15350as	17490eu
			17570eu	17690pa	17750as	
0900	1000		Anguilla, Worldwide Univ Network		6090am	
0900	1000		Australia, ABC NT Alice Springs		2310do	
			4835do			
0900	1000		Australia, ABC NT Katherine	2485do		
0900	1000		Australia, ABC NT Tennant Creek		2325do	
0900	1000		Australia, Radio Australia	9475va	9580va	
			9590va	11945as	12080as	
0900	1000		Bhutan, Bhutan Broadcasting Svc		6035as	
0900	1000		Canada, CFRX Toronto ON	6070na		
0900	1000		Canada, CFVP Calgary AB	6030na		
0900	1000		Canada, CKZN St John's NF	6160na		
0900	1000		Canada, CKZU Vancouver BC	6160na		
0900	1000		Costa Rica, Worldwide Univ Network		5030va	
			6150va	7375va	9725va	11870va
			13750va			
0900	1000		Germany, Deutsche Welle	17710as	21840as	
0900	1000	DRM	Germany, Deutsche Welle	9610eu		
0900	1000		Guyana, Voice of Guyana	3291do		
0900	1000		Malaysia, RTM/Traxx FM	7295as		
0900	1000		Netherlands, R Netherlands Worldwide		9795as	
0900	1000		New Zealand, Radio NZ International		9765pa	
0900	1000	DRM	New Zealand, Radio NZ International		9870pa	
0900	1000		Nigeria, Radio Nigeria/Kaduna	4770do		
0900	1000		Nigeria, Voice of Nigeria/Lagos		9690af	
0900	1000		Palau, T8WH/World Harvest	9930as	15680as	
0900	1000	vl	Papua New Guinea, R East New Britain		3385do	
0900	1000	vl	Papua New Guinea, Wantok R. Light		7325va	
0900	1000		Russia, Voice of Russia	15195as	17665pa	
0900	1000	DRM	Russia, Voice of Russia	13670eu		
0900	1000		Saudi Arabia, BSKA	15250af		
0900	1000	vl	Solomon Islands, SIBC	5020do		
0900	1000	vl	South Africa, Channel Africa	9625af		
0900	1000		UK, BBC World Service	6190af	6195as	
			9740as	9860af	11760me	
			15400af	15575me	17640af	17760as
			17790as	17830af	21470af	
0900	1000		USA, Armed Forces Radio Network		4319usb	
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
0900	1000		USA, WBOH Newport NC	5920am		
0900	1000		USA, WEWN Vandiver AL	9390as		
0900	1000	mtwhfa	USA, WHRI Cypress Creek SC	7315sa		
0900	1000	Sun	USA, WHRI Cypress Creek SC	7385na	9865sa	
0900	1000		USA, WINB Red Lion PA	9265am		
0900	1000		USA, WRMI Miami FL	9955am		
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCR Nashville TN	5070na	5890na	
			15825na			
1000	1100		USA, WWRB Manchester TN	3185va		
1000	1100		USA, WYFR/Family Radio Worldwide		5950am	
			6890na	6915na	7455na	9450as
			9465as	9900	skd0109	
1000	1100		Zambia CVC/ The Voice Africa	6065af	13590af	
1015	1045	Sun	UK, Bible Voice BC 5985as			
1030	1100		Australia, HCJB Global		15400as	
1030	1100		Iran, VOIRI/IRIB	15460as	17660as	
1030	1100	Sun	Italy, NEXUS/IRRS	9510va		
1030	1100		Mongolia, Voice of Mongolia	12085as		
1059	1100		New Zealand, Radio NZ International		13660pa	

0900	1000		USA, WRMI Miami FL	9955am		
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCR Nashville TN	5070na	5890na	
			9985na			
0900	1000		USA, WWRB Manchester TN	3185va		
0900	1000		USA, WYFR/Family Radio Worldwide		5950am	
			6915na	7455na	9450as	9465as
0900	1000	vl	Vanuatu, Radio Vanatu	7260do		
0900	1000		Zambia CVC/ The Voice Africa	6065af	13590af	
0930	1000		Australia, CVC International	15555as		

1000 UTC - 5AM EST / 4AM CST / 2AM PST

1000	1027		Czech Rep, Radio Prague	9955am	15710af	
			21745af			
1000	1030		Vietnam, Voice of Vietnam	9840as	12020as	
1000	1057		China, China Radio International		5995as	
			7135as	7215as	9415as	13590as
			13720as	15190as	15210pa	15270eu
			15350as	17490eu	17570eu	17690pa
			17750as			
1000	1058		New Zealand, Radio NZ International		9765pa	
1000	1058	DRM	New Zealand, Radio NZ International		9870pa	
1000	1100		Anguilla, Worldwide Univ Network		11775am	
1000	1100		Australia, ABC NT Alice Springs		2310do	
			4835do			
1000	1100		Australia, ABC NT Katherine	2485do		
1000	1100		Australia, ABC NT Tennant Creek		2325do	
1000	1100		Australia, CVC International	15555as		
1000	1100		Australia, Radio Australia	9475va	9580va	
			9590va	11945as	12080as	
1000	1100		Canada, CFRX Toronto ON	6070na		
1000	1100		Canada, CFVP Calgary AB	6030na		
1000	1100		Canada, CKZN St John's NF	6160na		
1000	1100		Canada, CKZU Vancouver BC	6160na		
1000	1100		Costa Rica, Worldwide Univ Network		5030va	
			6150va	7375va	9725va	11870va
			13750va			
1000	1100		Guyana, Voice of Guyana	3291do		
1000	1100		India, All India Radio	7270as	13710pa	
			15235as	15260as	17510as	17800as
			17895pa			
1000	1100		Indonesia, Voice of Indonesia	9526va	11784al	
1000	1100		Malaysia, RTM/Traxx FM	7295as		
1000	1100		Netherlands, R Netherlands Worldwide		6040as	
			9720as	12065as		
1000	1100		Nigeria, Radio Nigeria/Kaduna	4770do		
1000	1100		Nigeria, Voice of Nigeria/Lagos		9690af	
1000	1100		North Korea, Voice of Korea	6185as	6285am	
			9335am	9850as		
1000	1100		Palau, T8WH/World Harvest	9930as	12130as	
1000	1100	vl	Papua New Guinea, R East New Britain		3385do	
1000	1100	vl	Papua New Guinea, Wantok R. Light		7325va	
1000	1100		Saudi Arabia, BSKA	15250af		
1000	1100	vl	Solomon Islands, SIBC	5020do		
1000	1100	vl	South Africa, Channel Africa	9625af		
1000	1100	Sat/Sun	UK, BBC World Service	6190af	6195as	
			9605as	9740as	9860af	11760me
			15310af	15575as	17640af	17790as
			21470af			
1000	1100		Ukraine, R Ukraine International		9950eu	
1000	1100		USA, Armed Forces Radio Network		4319usb	
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
1000	1100		USA, KNLS Anchor Point AK	6150as		
1000	1100		USA, WBOH Newport NC	5920am		
1000	1100		USA, WEWN Vandiver AL	9390as		
1000	1100	Sun	USA, WHRI Cypress Creek SC	7315sa		
1000	1100	mtwhfa	USA, WHRI Cypress Creek SC	7385na	9865sa	
1000	1100		USA, WHRI Cypress Creek SC	7385na		
1000	1100		USA, WINB Red Lion PA	9265am		
1000	1100		USA, WRMI Miami FL	9955am		
1000	1100		USA, WTJC Newport NC	9370na		
1000	1100		USA, WWCR Nashville TN	5070na	5890na	
			15825na			
1000	1100		USA, WWRB Manchester TN	3185va		
1000	1100		USA, WYFR/Family Radio Worldwide		5950am	
			6890na	6915na	7455na	9450as
			9465as	9900	skd0109	
1000	1100		Zambia CVC/ The Voice Africa	6065af	13590af	
1015	1045	Sun	UK, Bible Voice BC 5985as			
1030	1100		Australia, HCJB Global		15400as	
1030	1100		Iran, VOIRI/IRIB	15460as	17660as	
1030	1100	Sun	Italy, NEXUS/IRRS	9510va		
1030	1100		Mongolia, Voice of Mongolia	12085as		
1059	1100		New Zealand, Radio NZ International		13660pa	

1300	1400	Malaysia, RTM/Traxx FM	7295as	
1300	1400	New Zealand, Radio NZ International	6170pa	
1300	1400	Nigeria, Radio Nigeria/Kaduna	4770do	
1300	1400	Nigeria, Voice of Nigeria/Lagos	9690af	
1300	1400	North Korea, Voice of Korea	7570eu	9335na
		11710na	12015eu	
1300	1400	Palau, T8WH/World Harvest	9930as	
1300	1400	Papua New Guinea, Wantok R. Light	7325va	
1300	1400	Solomon Islands, SIBC	5020do	9545al
1300	1400	South Korea, KBS World Radio	9570na	
		9770as		
1300	1400	UK, BBC World Service	5975as	6190af
		6195as	9410as	9740as
		11760me	15310as	15420af
		17640af	21470af	15575me
1300	1400	USA, Armed Forces Radio Network	4319usb	
		5446usb	5765usb	6350usb
		10320usb	12133usb	13362usb
1300	1400	USA, Voice of America	7575va	9640va
		11705va		
1300	1400	USA, WBOH Newport NC	5920am	
1300	1400	USA, WEWN Vandiver AL	5755va	
1300	1400	USA, WHRA Greenbush ME	15665af	
1300	1400	USA, WHRI Cypress Creek SC	9495sa	9840na
1300	1400	USA, WHRI Cypress Creek SC	11785na	
1300	1400	USA, WINB Red Lion PA	9265am	
1300	1400	USA, WRMI Miami FL	9955am	
1300	1400	USA, WTJC Newport NC	9370na	
1300	1400	USA, WWCR Nashville TN	7490na	9980na
		15825na		
1300	1400	USA, WWRB Manchester TN	9385va	
1300	1400	USA, WYFR/Family Radio Worldwide	11830na	
		11520as	11560as	11855na
		15670as		13810as
1300	1400	Zambia CVC/ The Voice Africa	6065af	13590af
1310	1340	Japan, NHK World Radio Japan	9875as	
1330	1357	Czech Rep, Radio Prague	9850eu	
1330	1400	Australia, HCJB Global	15435as	
1330	1400	Guam, KSDA/ AWR	11935as	15660as
1330	1400	India, All India Radio	9690as	11620as
		13710as		
1330	1400	Laos, National Radio	7145as	
1330	1400	Sweden, Radio Sweden	7465va	
1330	1400	Turkey, Voice of Turkey	11735pa	12035eu
1330	1400	Vietnam, Voice of Vietnam	9840as	12020as
1355	1400	Guam, KTWR/TWR	9975as	

1400 UTC - 9AM EST / 8AM CST / 6AM PST

1400	1425	Turkey, Voice of Turkey	11735pa	12035eu
1400	1427	Czech Rep, Radio Prague	11600as	13580na
1400	1428	Serbia, Intl Radio Serbia	7200eu	
1400	1430	Australia, HCJB Global	15400as	15425as
1400	1430	Australia, Radio Australia	5995va	6080va
		7240va	9590va	
1400	1430	Germany, Pan American BC	15205as	
1400	1430	Guam, KTWR/TWR	9975as	
1400	1430	Japan, NHK World Radio Japan	9875as	
		11705va	11780eu	21560eu
1400	1430	New Zealand, Radio NZ International	9750pa	
1400	1430	Thailand, Radio Thailand World Svc	9725va	
1400	1430	United Arab Emirates, FEBA	12045as	
1400	1457	China, China Radio International	5995as	
		7300as	9460as	9700eu
		9795as	11665as	11675na
		13740na	15230na	17630af
1400	1500	Anguilla, Worldwide Univ Network	11775am	
1400	1500	Australia, CVC International	13635as	
1400	1500	Bhutan, Bhutan Broadcasting Svc	6035as	
1400	1500	Canada, CBC NQ SW Service	9625na	
1400	1500	Canada, CFRX Toronto ON	6070na	
1400	1500	Canada, CFVP Calgary AB	6030na	
1400	1500	Canada, CKZN St John's NF	6160na	
1400	1500	Canada, CKZU Vancouver BC	6160na	
1400	1500	Costa Rica, Worldwide Univ Network	9725va	
		11870va	13750va	
1400	1500	Germany, CVC Intl/Voice Africa	15745af	
1400	1500	Germany, Overcomer Ministries	6110eu	
		13810eu		
1400	1500	Guam, KTWR/TWR	9975as	
1400	1500	India, All India Radio	9690as	11620as
		13710as		
1400	1500	Iran, VOIRI/IRIB	15460as	17660as
1400	1500	Jordan, Radio Jordan	11690na	
1400	1500	Libya, Voice of Africa	17725af	21695af
1400	1500	Malaysia, RTM/Traxx FM	7295as	
1400	1500	Netherlands, R Netherlands Worldwide	5825as	
		9345as	11520as	12080as
				15595as

1400	1500	New Zealand, Radio NZ International	6170pa	
1400	1500	Nigeria, Radio Nigeria/Kaduna	4770do	
1400	1500	Nigeria, Voice of Nigeria/Lagos	9690af	
1400	1500	Oman, Radio Oman	15140as	
1400	1500	Palau, T8WH/World Harvest	9930as	9955as
1400	1500	Papua New Guinea, Wantok R. Light	7325va	
1400	1500	Solomon Islands, SIBC	5020do	9545al
1400	1500	UK, BBC World Service	5960as	5975as
		6190af	6195as	9410as
		9860af	11760me	11915as
		21470af		15420af
1400	1500	Sat/Sun	UK, Bible Voice BC	11695as
1400	1500		USA, Armed Forces Radio Network	4319usb
			5446usb	5765usb
			10320usb	12133usb
			13362usb	
1400	1500		USA, KJES Vado NM	11715na
1400	1500		USA, KNLS Anchor Point AK	6150as
1400	1500		USA, Voice of America	4930af
			7575va	9480va
			12150va	15205va
			17750af	15580af
1400	1500		USA, WBOH Newport NC	5920am
1400	1500		USA, WEWN Vandiver AL	5755va
1400	1500		USA, WHRA Greenbush ME	15665af
1400	1500	Sat/Sun	USA, WHRI Cypress Creek SC	9495sa
1400	1500		USA, WHRI Cypress Creek SC	11785na
1400	1500		USA, WINB Red Lion PA	13570am
1400	1500		USA, WRMI Miami FL	9955na
1400	1500		USA, WTJC Newport NC	9370na
1400	1500		USA, WWCR Nashville TN	7490na
			15825na	9980na
1400	1500		USA, WWRB Manchester TN	9385va
1400	1500		USA, WYFR/Family Radio Worldwide	6135as
			7320as	9365as
			11560as	9615as
			11565na	9865as
			11860as	11725as
			13695na	11855
			13810as	17760am
1400	1500		Zambia CVC/ The Voice Africa	6065af
1415	1430	mtwhfa	Germany, Pan American BC	15205as
1415	1430		Nepal, Radio Nepal	5005as
1415	1430	mwa	United Arab Emirates, FEBA	12045as
1430	1445	Sun	Germany, Pan American BC	15205as
1430	1445	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu
1430	1500		Australia, Radio Australia	5995va
			7240va	9475as
			9590va	11660pa
1430	1500		Ethiopia, Radio Ethiopia	5990af
			9704af	7110af
1430	1500	f/ DRM	South Korea, KBS World Radio	9750eu
1430	1500		Sweden, Radio Sweden	9400va

1500 UTC - 10AM EST / 9AM CST / 7AM PST

1500	1510	mtwhfa	Turkmenistan, Turkmen Radio	5015eu
1500	1527		Czech Rep, Radio Prague	9955na
1500	1528		Vietnam, Voice of Vietnam	7285va
			12020va	9840va
1500	1530		Australia, HCJB Global	15425as
1500	1530		Guam, KSDA/ AWR	12105as
1500	1530		Nigeria, Radio, National Svc/Abuja	7275do
1500	1530		UK, BBC World Service	9410af
			15105af	11860af
1500	1530	Sat	UK, Bible Voice BC	11895as
1500	1545		USA, WYFR/Family Radio Worldwide	15210sa
1500	1550		New Zealand, Radio NZ International	6170pa
1500	1557		Canada, R Canada International	9635as
			11975as	
1500	1557		China, China Radio International	5955as
			6095va	7160as
			7325as	9435eu
			9525eu	9720va
			13685af	9785as
			13740na	17630af
1500	1557		Libya, Voice of Africa	17725af
1500	1600		Anguilla, Worldwide Univ Network	21695af
1500	1600		Australia, CVC International	11775am
1500	1600		Australia, Radio Australia	13635as
			5995va	6080va
			7240va	9475as
1500	1600	Sat/Sun	Canada, CBC NQ SW Service	9590va
1500	1600		Canada, CFRX Toronto ON	9625na
1500	1600		Canada, CFVP Calgary AB	6070na
1500	1600		Canada, CKZN St John's NF	6030na
1500	1600		Canada, CKZU Vancouver BC	6160na
1500	1600		Costa Rica, Worldwide Univ Network	6160na
			11870va	13750va
			9725va	
1500	1600		Germany, CVC Intl/Voice Africa	15745af
1500	1600		Germany, Overcomer Ministries	6110eu
			13810me	17485af
1500	1600	vl	Italy, NEXUS/IRRS	15650af
1500	1600		Jordan, Radio Jordan	11690na
1500	1600		Malaysia, RTM/Traxx FM	7295as
1500	1600		Myanmar, Myanma Radio	5985as

1500	1600		Netherlands, R Netherlands Worldwide	5825as	
			9345as	11520as	12080as
1500	1600		Nigeria, Radio Nigeria/Kaduna	4770do	
1500	1600		Nigeria, Voice of Nigeria/Lagos	9690af	
1500	1600		North Korea, Voice of Korea	7570eu	9335na
			11710na	12015eu	
1500	1600		Palau, T8WH/World Harvest	9930as	
1500	1600	vl	Papua New Guinea, Wantok R. Light	7325va	
1500	1600		Russia, Voice of Russia	7350as	7260as
			9660as		
1500	1600	DRM	Russia, Voice of Russia	5905eu	9675eu
1500	1600	vl	Solomon Islands, SIBC	5020do	9545al
1500	1600	vl	South Africa, Channel Africa	9625af	
1500	1600		Uganda, Dunamis Shortwave	4750af	
1500	1600	DRM	UK, BBC World Service	5970eu	
1500	1600		UK, BBC World Service	5975as	6040as
			6190af	6195as	9410as
			9855va	9860af	11915me
			15400af	21470af	
1500	1600		USA, Armed Forces Radio Network	4319usb	
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
1500	1600		USA, KJES Vado NM	11715na	
1500	1600		USA, Voice of America	4930af	6080af
			6140af	7520va	7575va
			9685va	9760va	11525va
			12150va	13735va	15460va
			17715af	17895af	
1500	1600		USA, WBCQ Monticello ME	9330am	
1500	1600		USA, WBOH Newport NC	5920am	
1500	1600		USA, WEWN Vandiver AL	5755va	
1500	1600	mtwhfa	USA, WHRA Greenbush ME	15665af	
1500	1600	Sun	USA, WHRA Greenbush ME	13650af	
1500	1600	Sat/Sun	USA, WHRI Cypress Creek SC	9495sa	9840na
1500	1600		USA, WHRI Cypress Creek SC	11785na	
1500	1600		USA, WINB Red Lion PA	13570am	
1500	1600		USA, WRMI Miami FL	9955na	
1500	1600		USA, WTJC Newport NC	9370na	
1500	1600		USA, WWCR Nashville TN	7490na	9980na
			15825na		
1500	1600		USA, WWRB Manchester TN	9385va	
1500	1600		USA, WYFR/Family Radio Worldwide	6180as	
			7320as	11565na	11855na
			15520as	15750af	17760am
1500	1600		Zambia CVC/ The Voice Africa	6065af	13650af
1507	1600		Canada, R Canada International	9610as	
1507	1600	DRM	Canada, R Canada International	9800na	
1515	1530	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu	
1530	1557		China, China Radio International	9600me	
1530	1600	mtwhfa	Albania, Radio Tirana	13720na	
1530	1600		Germany, AWR-Europe	11675as	
1530	1600		Iran, VOIRI/IRIB	6160as	7330as
1530	1600		Mongolia, Voice of Mongolia	12085as	
1530	1600		Sweden, Radio Sweden	9360va	
1530	1600	Sat	UK, BBC World Service	9410af	11860af
			15105af		
1530	1600		UK, Bible Voice BC 12035as		
1530	1600	mtwhf	UK, Sudan Radio Service	9840af	
1551	1600	DRM	New Zealand, Radio NZ International	6170pa	
1551	1600		New Zealand, Radio NZ International	7145pa	

1600 UTC - 11AM EST / 10AM CST / 8AM PST

1600	1615	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu	
1600	1615		Pakistan, Radio Pakistan	9385va	11565va
			15100af		
1600	1615	Sat	UK, BBC World Service	9410af	11860af
			15105af		
1600	1627		Iran, VOIRI/IRIB	6160as	7330as
1600	1628		Vietnam, Voice of Vietnam	7220va	7280va
			9550va	9730va	
1600	1630	Sun	Germany, Pan American BC	13830me	
1600	1630		Guam, KSDA/ AWR	9585as	11690as
1600	1630		Myanmar, Myanma Radio	9730do	
1600	1630		Nigeria, Voice of Nigeria/Lagos	9690af	
1600	1630		Yemen, Rep of Yemen Radio	9780me	
1600	1645		USA, WYFR/Family Radio Worldwide	11565na	
			11830na	17760am	
1600	1650	DRM	New Zealand, Radio NZ International	6170pa	
1600	1650		New Zealand, Radio NZ International	7145pa	
1600	1657		China, China Radio International	6060as	
			7110af	7235as	7255eu
			9525eu	9600af	11650eu
1600	1658		Germany, Deutsche Welle	5965as	9560as
1600	1700		Anguilla, Worldwide Univ Network	11775am	
1600	1700		Australia, CVC International	13635as	
1600	1700		Australia, Radio Australia	5995va	6080va
			7240as	9475va	9580va

1600	1700	Sat	Canada, CBC NQ SW Service	9625na	
1600	1700		Canada, CFRX Toronto ON	6070na	
1600	1700		Canada, CFVP Calgary AB	6030na	
1600	1700		Canada, CKZN St John's NF	6160na	
1600	1700		Canada, CKZU Vancouver BC	6160na	
1600	1700		Canada, R Canada International	9610as	
1600	1700	DRM	Canada, R Canada International	9800na	
1600	1700		Costa Rica, Worldwide Univ Network	11870va	
			13750va		
1600	1700		Egypt, Radio Cairo	12170af	
1600	1700		Ethiopia, Radio Ethiopia	7165af	9560af
1600	1700		France, Radio France International	11615af	
			15605af		
1600	1700		Germany, CVC Intl/Voice Africa	15745af	
1600	1700	vl	Italy, NEXUS/IRRS	15650af	
1600	1700		Malaysia, RTM/Traxx FM	7295as	
1600	1700		Nigeria, Radio Nigeria/Kaduna	4770do	
1600	1700		North Korea, Voice of Korea	9990va	11545va
1600	1700		Palau, T8WH/World Harvest	9930as	
1600	1700	vl	Papua New Guinea, Wantok R. Light	7325va	
1600	1700		Russia, Voice of Russia	4965va	4975va
			6130eu	7260as	7305as
			9470va		7320as
1600	1700	vl	Rwanda, Radio Rwanda	6055do	
1600	1700	vl	Solomon Islands, SIBC	5020do	9545al
1600	1700		South Korea, KBS World Radio	9515eu	
1600	1700		Taiwan, R Taiwan International	9785as	11550as
1600	1700		Uganda, Dunamis Shortwave	4750af	
1600	1700	DRM	UK, BBC World Service	5970eu	
1600	1700		UK, BBC World Service	3255af	5975as
			6190af	7270af	9740as
			15400af	15420af	21470af
1600	1700		USA, Armed Forces Radio Network	4319usb	
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
1600	1700		USA, Voice of America	4930af	6080af
			9345va	13600va	15445va
			17715af	17895af	
1600	1700		USA, WBCQ Monticello ME	9330am	
1600	1700		USA, WBOH Newport NC	5920am	
1600	1700		USA, WEWN Vandiver AL	5755va	
1600	1700		USA, WHRA Greenbush ME	17650af	
1600	1700		USA, WHRI Cypress Creek SC	9495sa	9840va
			11785na		
1600	1700		USA, WINB Red Lion PA	13570am	
1600	1700		USA, WRMI Miami FL	9955na	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCR Nashville TN	9980na	12160na
			15825na		
1600	1700		USA, WWRB Manchester TN	9385va	
1600	1700		USA, WYFR/Family Radio Worldwide	6085sa	
			11760af	11850as	13630af
			15705af	17690af	18980eu
1600	1700		Zambia CVC/ The Voice Africa	6065af	13650af
1605	1700		Canada, R Canada International	9610as	
1605	1700	DRM	Canada, R Canada International	9800na	
1615	1700	Sat/Sun	UK, BBC World Service	9410af	11860af
			15105af		
1630	1700		Guam, KSDA/ AWR	11980as	
1630	1700		Nigeria, Voice of Nigeria/Lagos	9690af	15120af
1630	1700	Sun	UK, Bible Voice BC 9460me		
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930eu	
1645	1700	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu	
1645	1700		Tajikistan, Tajik Radio	7245as	
1645	1700	mwhfa	UK, Bible Voice BC 9460me		
1651	1700	DRM	New Zealand, Radio NZ International	9890pa	
1651	1700		New Zealand, Radio NZ International	9765pa	

1700 UTC - 12PM EST / 11AM CST / 9AM PST

1700	1704		Canada, R Canada International	9610as	
1700	1704	DRM	Canada, R Canada International	9800na	
1700	1705	Sun	Croatia, Voice of Croatia	6165eu	
1700	1715	mtwhfa	Croatia, Voice of Croatia	6165eu	
1700	1715	whfa	UK, Bible Voice BC 9460me		
1700	1720	t	UK, Bible Voice BC 9460me		
1700	1727		Czech Rep, Radio Prague	5930eu	15710af
1700	1730		Jordan, Radio Jordan	11690na	
1700	1730	Sat	USA, WRMI Miami FL	9955am	
1700	1745		UK, BBC World Service	9410af	11860af
1700	1750	DRM	New Zealand, Radio NZ International	9890pa	
1700	1750		New Zealand, Radio NZ International	9765pa	
1700	1757		China, China Radio International	6090as	
			6100va	6140as	7100me
			7130as	7180as	7205eu
			7335eu	9600me	7255eu
1700	1800		Anguilla, Worldwide Univ Network	11775am	

1700	1800		Australia, CVC International	13635as	
1700	1800		Australia, Radio Australia	5995va	6080va
			9475as	9580va	9710as
1700	1800	Sat	Canada, CBC NQ SW Service	9625na	
1700	1800		Canada, CFRX Toronto ON	6070na	
1700	1800		Canada, CFVP Calgary AB	6030na	
1700	1800		Canada, CKZN St John's NF	6160na	
1700	1800		Canada, CKZU Vancouver BC	6160na	
1700	1800		Canada, R Canada International		9610as
1700	1800		Costa Rica, Worldwide Univ Network		11870va
			13750va		
1700	1800		Egypt, Radio Cairo	12170af	
1700	1800		Equatorial Guinea, Radio Africa		15190af
1700	1800		Germany, CVC Intl/Voice Africa		15745af
1700	1800	vl	Italy, NEXUS/IRRS	15650af	
1700	1800		Malaysia, RTM/Traxx FM	7295as	
1700	1800		Nigeria, Radio Nigeria/Kaduna	4770do	
1700	1800		Nigeria, Voice of Nigeria/Lagos		15120af
1700	1800		Palau, T8WH/World Harvest	9930as	
1700	1800	vl	Papua New Guinea, Wantok R. Light		7325va
1700	1800		Russia, Voice of Russia	4975me	6175as
			7125as	7320eu	9470va
1700	1800	vl	Rwanda, Radio Rwanda	6055do	
1700	1800	vl	Solomon Islands, SIBC	5020eu	9545al
1700	1800	vl	South Africa, Channel Africa	15235af	
1700	1800		Taiwan, R Taiwan International	11850eu	
1700	1800		Uganda, Dunamis Shortwave	4750af	
1700	1800		UK, BBC World Service	3255af	5975as
			6190af	7270as	9740as
			12095af	15400af	15420af
1700	1800	DRM	UK, BBC World Service	3995eu	
1700	1800	Sun	UK, Bible Voice BC 9460me		
1700	1800		USA, Armed Forces Radio Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
1700	1800		USA, Voice of America	6080af	13710af
			15580af	17895af	
1700	1800		USA, WBOH Newport NC	5920am	
1700	1800		USA, WEWN Vandiver AL	15610eu	
1700	1800		USA, WHRA Greenbush ME	17650af	
1700	1800		USA, WHRI Cypress Creek SC	9495sa	9840va
			11785na		
1700	1800		USA, WINB Red Lion PA	13570am	
1700	1800		USA, WRMI Miami FL	9955am	
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WWCR Nashville TN	9980na	12160na
			15825na		
1700	1800		USA, WWRB Manchester TN	9385va	
1700	1800		USA, WYFR/Family Radio Worldwide		9790af
			13630af	13695na	17545af
			18980eu	21455eu	17555am
1700	1800		Zambia CVC/ The Voice Africa	4965af	9420af
1715	1730		Vatican City, Vatican Radio	4005eu	5885eu
			7250eu	7290eu	9645eu
1715	1800		UK, Bible Voice BC 9460me		
1730	1745		UK, Bible Voice BC 9460me		
1730	1800		Slovakia, R Slovakia International		5915eu
			6055eu		
1730	1800	mtwhf	UK, Sudan Radio Service	9840af	
1730	1800		Vatican City, Vatican Radio	9755af	11625af
			13765af		
1745	1800		Bangladesh, Bangla Betar	7250as	
1745	1800		India, All India Radio	7410eu	9445af
			9950eu	11620eu	11935af
			15155af	17670af	15075af
1751	1800	DRM	New Zealand, Radio NZ International		9890pa
1751	1800		New Zealand, Radio NZ International		9765pa

1800 UTC - 1PM EST / 12PM CST / 10AM PST

1800	1804		Canada, R Canada International	9610as	
1800	1815	vl	UK, Bible Voice BC 9460me		
1800	1827		Czech Rep, Radio Prague	5930eu	9400va
1800	1828		Vietnam, Voice of Vietnam	9765eu	
1800	1830		Australia, CVC International	13635as	
1800	1830		Nigeria, Radio, National Svc/Abuja		7275do
1800	1830		Poland, Polish Radio	6015eu	7345eu
1800	1830	DRM	Romania, R Romania International		5895eu
1800	1830		South Africa, AWR Africa	3215af	3345af
			11830af		
1800	1830		UK, BBC World Service	7260as	9740as
1800	1830	mtwhf	USA, Voice of America	4930af	12080af
			15775af		
1800	1850		New Zealand, Radio NZ International		9765pa
1800	1850	DRM	New Zealand, Radio NZ International		9890pa
1800	1856		Romania, R Romania International		7215eu
			9640eu		
1800	1857		China, China Radio International		6020eu

			6100eu	6165me	7100eu	7265eu
1800	1859		Canada, R Canada International			7185af
			11875af	13650af	15365af	17790af
1800	1900		Anguilla, Worldwide Univ Network			11775am
1800	1900	mtwhf	Argentina, RAE	15345va		
1800	1900		Australia, Radio Australia		6080va	7240as
			9475va	9580as	9710as	11880as
1800	1900		Bangladesh, Bangla Betar		7250eu	
1800	1900		Canada, CFRX Toronto ON		6070na	
1800	1900		Canada, CFVP Calgary AB		6030na	
1800	1900		Canada, CKZN St John's NF		6160na	
1800	1900		Canada, CKZU Vancouver BC		6160na	
1800	1900		Costa Rica, Worldwide Univ Network			11870va
			13750va			
1800	1900		Equatorial Guinea, Radio Africa			15190af
1800	1900		Germany, CVC Intl/Voice Africa			11775af
1800	1900	DRM	Germany, Deutsche Welle	3995eu		
1800	1900		India, All India Radio	7410eu	9445af	
			9950eu	11620eu	11935af	15075af
			15155af	17670af		
1800	1900		Kuwait, Radio Kuwait		11990va	
1800	1900		Malaysia, RTM/Traxx FM		7295as	
1800	1900		Netherlands, R Netherlands Worldwide			6020af
			11655af	12045af		
1800	1900		Nigeria, Radio Nigeria/Kaduna	4770do		
1800	1900		Nigeria, Voice of Nigeria/Lagos			15120af
1800	1900		North Korea, Voice of Korea	7570eu	12015eu	
1800	1900		Palau, T8WH/World Harvest	9930as	9955as	
1800	1900	vl	Papua New Guinea, Wantok R. Light		7325va	
1800	1900	DRM	Poland, Polish Radio	6015eu		
1800	1900		Russia, Voice of Russia	4975me	6125as	
			7230af	7240eu	7320eu	7335va
			11510af			
1800	1900	Sat/Sun	Russia, Voice of Russia		6055eu	6175eu
			6245eu			
1800	1900	vl	Rwanda, Radio Rwanda		6055do	
1800	1900	vl	Solomon Islands, SIBC		5020do	9545al
1800	1900		South Korea, KBS World Radio			7275eu
1800	1900		Swaziland, TWR	3200af		
1800	1900		Taiwan, R Taiwan International	3965eu		
1800	1900		Uganda, Dunamis Shortwave	4750af		
1800	1900		UK, BBC World Service	3255af	5875eu	
			5945me	5955va	6190af	7390eu
			9630af	12095af	15400af	15420af
1800	1900	Sat/Sun	UK, Bible Voice BC 6110me	9460	skd1208	
1800	1900		USA, Armed Forces Radio Network		4319usb	
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
1800	1900		USA, Voice of America	4930af	6080af	
			11975af	13710af	15580af	17895af
1800	1900		USA, WBCQ Monticello ME		15420am	
1800	1900		USA, WBOH Newport NC		5920am	
1800	1900	mtwhf	USA, WEWN Vandiver AL		15610eu	
1800	1900	Sat	USA, WHRA Greenbush ME		15665af	
1800	1900	Sun	USA, WHRA Greenbush ME		13730af	
1800	1900	mtwhf	USA, WHRA Greenbush ME		17650af	
1800	1900	Sat/Sun	USA, WHRI Cypress Creek SC		17650va	
			USA, WHRI Cypress Creek SC		9495va	
1800	1900		USA, WHRI Cypress Creek SC		9840va	11785na
1800	1900		USA, WINB Red Lion PA		13570am	
1800	1900		USA, WRMI Miami FL		9955am	
1800	1900		USA, WTJC Newport NC		9370na	
1800	1900		USA, WWCR Nashville TN		9980na	12160na
			15825na			
1800	1900		USA, WWRB Manchester TN		9385va	
1800	1900		USA, WYFR/Family Radio Worldwide		3975eu	
			6045af	7395af	9895af	13630af
			13695na	13730af	13780me	15115af
			17535am	17555am	18980eu	
1800	1900		Yemen, Rep of Yemen Radio		9780me	
1800	1900		Zambia CVC/ The Voice Africa		4965af	9420af
1830	1900		Bulgaria, Radio Bulgaria		6200eu	7400eu
1830	1900		UK, BBC World Service		6005af	9410af
1830	1900		UK, Bible Voice BC 9460me			
1845	1900	Sun	UK, Bible Voice BC 7260af			
1851	1900	DRM	New Zealand, Radio NZ International		9890pa	
1851	1900		New Zealand, Radio NZ International		11725pa	

1900 UTC - 2PM EST / 1PM CST / 11AM PST

1900	1928		Vietnam, Voice of Vietnam	7280va	9730va
1900	1929		Germany, Deutsche Welle	11690af	
1900	1930		Germany, Deutsche Welle	9735af	13780af
			15275af		
1900	1935		New Zealand, Radio NZ International		11725pa
1900	1935	DRM	New Zealand, Radio NZ International		9890pa
1900	1945		India, All India Radio	7410eu	9445af
			9950eu	11620eu	11935af
					15075af

2000 UTC - 3PM EST / 2PM CST / 12PM PST

1900	1945	Sat	15155af	17670af		
1900	1945		UK, Bible Voice BC 6015eu	9460me	7245af	
			USA, WYFR/Family Radio Worldwide		6085sa	
			15565eu	18980eu		
1900	1957		China, China Radio International		7285eu	
			7295va	9440va		
1900	1957		USA, WYFR/Family Radio Worldwide		3975eu	
			7395af			
1900	2000		Anguilla, Worldwide Univ Network		11775am	
1900	2000		Australia, Radio Australia	6080va	7240as	
			9500va	9580va	9710as	11880as
1900	2000		Canada, CFRX Toronto ON	6070na		
1900	2000		Canada, CFVP Calgary AB	6030na		
1900	2000		Canada, CKZN St John's NF	6160na		
1900	2000		Canada, CKZU Vancouver BC	6160na		
1900	2000		Costa Rica, Worldwide Univ Network		11870va	
			13750va			
1900	2000		Egypt, Radio Cairo 9310af			
1900	2000		Equatorial Guinea, Radio Africa		15190af	
1900	2000		Germany, CVC Intl/Voice Africa		11775af	
1900	2000		Germany, Overcomer Ministries		3975eu	
1900	2000		Iran, VOIRI/IRIB	6160as	7330as	
1900	2000	fas	Italy, NEXUS/IRRS	7290va		
1900	2000		Kuwait, Radio Kuwait	11990va		
1900	2000		Malaysia, RTM/Traxx FM	7295as		
1900	2000		Netherlands, R Netherlands Worldwide		7120af	
			11655af	11805af	12045af	
1900	2000		Nigeria, Radio Nigeria/Kaduna	4770do		
1900	2000		Nigeria, Voice of Nigeria/Lagos		15120af	
1900	2000		North Korea, Voice of Korea	7100af	9975va	
			11535va	11910af		
1900	2000		Palau, T8WH/World Harvest	9930as		
1900	2000	vl	Papua New Guinea, Wantok R. Light		7325va	
1900	2000		Russia, Voice of Russia	6175eu	7240eu	
			7290eu	7335af	11510af	
1900	2000	vl	Rwanda, Radio Rwanda	6055do		
1900	2000	vl	Solomon Islands, SIBC	5020do		
1900	2000	vl	South Africa, Channel Africa	3345af		
1900	2000	mtwhf	Spain, Radio Exterior Espana	9605af	9690eu	
1900	2000		Swaziland, TWR	3200af		
1900	2000		Thailand, Radio Thailand World Svc		9805eu	
1900	2000	vl	Uganda, UBC Radio	4976do	5026do	
1900	2000		UK, BBC World Service	3255af	5875eu	
			5945me	5955va	6190af	7390eu
			9630af	12095af	15400af	
1900	2000	Sun	UK, Bible Voice BC 7260af	9470me		
1900	2000		USA, Armed Forces Radio Network		4319usb	
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
1900	2000		USA, KJES Vado NM	15385na		
1900	2000		USA, Voice of America	4930af	4940af	
			6080af	9785va	11975af	12020va
			13710af	15580af	17895af	
1900	2000	mtwhf	USA, WBCQ Monticello ME	7415am	9330am	
1900	2000		USA, WBCQ Monticello ME	15420am		
1900	2000		USA, WBOH Newport NC	5920am		
1900	2000		USA, WEWN Vandiver AL	15610eu		
1900	2000	mtwhf	USA, WHRA Greenbush ME	13730af		
1900	2000		USA, WHRI Cypress Creek SC	9495sa	9840va	
			11785na			
1900	2000		USA, WINB Red Lion PA	13570am		
1900	2000		USA, WRMI Miami FL	9955am		
1900	2000		USA, WTJC Newport NC	9370na		
1900	2000		USA, WWCN Nashville TN	9980na	12160na	
			15825na			
1900	2000		USA, WWRB Manchester TN	9385va		
1900	2000		USA, WYFR/Family Radio Worldwide		3230af	
			6020af	7240eu	7345me	7395af
			9480af	9520eu	9610af	9885af
			13695na	15115af	17535na	17555am
1900	2000		Zambia CVC/ The Voice Africa	4965af	9420af	
1905	1910	Sat	Croatia, Voice of Croatia	6165eu		
1905	1915	mtwhf	Croatia, Voice of Croatia	6165eu		
1905	2000	Mon	South Africa, SA Radio League	3215af		
1930	1958		Serbia, Intl Raido Serbia	6100eu	7200eu	
1930	2000	fas	Germany, Pan American BC	9515af		
1930	2000		Iran, VOIRI/IRIB	6010eu	6115eu	7320eu
			9855af	11695af		
1930	2000		Slovakia, R Slovakia International		5915eu	
			7345eu			
1930	2000		Turkey, Voice of Turkey	6050eu		
1930	2000		UK, Bible Voice BC 9470me			
1936	1950		New Zealand, Radio NZ International		11725pa	
1945	2000	mtwhfa	Albania, Radio Tirana	7465eu	11645na	
1951	2000	DRM	New Zealand, Radio NZ International		13730pa	
1951	2000		New Zealand, Radio NZ International		11725pa	

2000	2005	Mon	South Africa, SA Radio League	3215af		
2000	2015	Sun	Germany, Pan American BC	9515af		
2000	2025		Turkey, Voice of Turkey	6050eu		
2000	2027		China, China Radio International		7160eu	
2000	2027		Iran, VOIRI/IRIB	6010eu	6115eu	7320eu
			9855af	11695af		
2000	2030		Egypt, Radio Cairo 9310af			
2000	2030	fa	Germany, Pan American BC	9515af		
2000	2030		Swaziland, TWR	3200af		
2000	2030		USA, Voice of America	4930af	4940af	
			6080af	11975af	13710af	
2000	2030		Vatican City, Vatican Radio	7365af	9755af	
			11625af			
2000	2045		USA, WYFR/Family Radio Worldwide	5745eu		
			9480af	9610af	9635af	11970eu
			15115af	15195af	17535na	17575sa
2000	2050		New Zealand, Radio NZ International		11725pa	
2000	2050	DRM	New Zealand, Radio NZ International		13730pa	
2000	2057		China, China Radio International		5960eu	
			5985va	7190eu	7285eu	7295va
			9440va	9660eu	11640va	13630va
2000	2057		Germany, Deutsche Welle	9735af		
2000	2058		Germany, Deutsche Welle	13780af		
2000	2059		Germany, Deutsche Welle	9690af	15275af	
2000	2100		Anguilla, Worldwide Univ Network		11775am	
2000	2100		Australia, ABC NT Alice Springs		2310do	
			4835do			
2000	2100		Australia, ABC NT Katherine	2485do		
2000	2100		Australia, ABC NT Tennant Creek		2325do	
2000	2100	Sat/Sun	Australia, Radio Australia	6080va	7240va	
			12080as			
2000	2100		Australia, Radio Australia	9500va	11650as	
			11660pa	11880as		
2000	2100		Canada, CFRX Toronto ON	6070na		
2000	2100		Canada, CFVP Calgary AB	6030na		
2000	2100		Canada, CKZN St John's NF	6160na		
2000	2100		Canada, CKZU Vancouver BC	6160na		
2000	2100		Costa Rica, Worldwide Univ Network		13750va	
2000	2100		Equatorial Guinea, Radio Africa		15190af	
2000	2100		Germany, CVC Intl/Voice Africa		11775af	
2000	2100	fas	Italy, NEXUS/IRRS	7290va		
2000	2100		Kuwait, Radio Kuwait	11990va		
2000	2100	vl	Liberia, ELWA	4760do		
2000	2100		Malaysia, RTM/Traxx FM	7295as		
2000	2100		Netherlands, R Netherlands Worldwide		7120af	
			11655af	17810af		
2000	2100		Nigeria, Radio Nigeria/Kaduna	4770do		
2000	2100		Nigeria, Voice of Nigeria/Lagos		15120af	
2000	2100		Palau, T8WH/World Harvest	9930as		
2000	2100	vl	Papua New Guinea, R East New Britain		3385do	
2000	2100	vl	Papua New Guinea, Wantok R. Light		7325va	
2000	2100		Russia, Voice of Russia	6145eu	7240eu	
			7330eu			
2000	2100	vl	Rwanda, Radio Rwanda	6055do		
2000	2100	vl	South Africa, Channel Africa	3345af		
2000	2100	vl	Uganda, UBC Radio	4976do	5026do	
2000	2100		UK, BBC World Service	3255af	6190af	
			9630af	12095af	15400af	
2000	2100	DRM	UK, BBC World Service	5875eu		
2000	2100		Ukraine, R Ukraine International		5840eu	
2000	2100		USA, Armed Forces Radio Network		4319usb	
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
2000	2100		USA, WBCQ Monticello ME	15420am		
2000	2100	smtwhf	USA, WBCQ Monticello ME	7415am		
2000	2100		USA, WBOH Newport NC	5920am		
2000	2100		USA, WEWN Vandiver AL	11520me		
2000	2100	Sat/Sun	USA, WHRA Greenbush ME	11740af		
2000	2100	mtwhf	USA, WHRA Greenbush ME	7520va		
2000	2100	asmtwh	USA, WHRI Cypress Creek SC	9495va		
2000	2100	f	USA, WHRI Cypress Creek SC	15665va		
2000	2100		USA, WHRI Cypress Creek SC	9515va	11785na	
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100		USA, WRMI Miami FL	9955am		
2000	2100		USA, WTJC Newport NC	9370na		
2000	2100		USA, WWCN Nashville TN	9980na	12160na	
			15825na			
2000	2100		USA, WWRB Manchester TN	9385va		
2000	2100		USA, WYFR/Family Radio Worldwide	6020af		
			7430eu	9480af	9610af	9635af
			11970eu	15115af	15195af	17535na
			17575sa			
2000	2100		Zambia CVC/ The Voice Africa	4965af	9420af	
2030	2045		Thailand, Radio Thailand World Svc		9535eu	
2030	2058		Vietnam, Voice of Vietnam	7220va	7280va	
			9550va	9730va		

2030	2100		Cuba, Radio Havana Cuba	11760va	
2030	2100		Sweden, Radio Sweden	9895va	
2030	2100		USA, Voice of America	4930af	4940af
			6080af	7595as	11975af 13710af
2045	2100		India, All India Radio	7410eu	9445eu
			9910pa	9950eu	11620eu 11715pa
2045	2100	DRM	Vatican City, Vatican Radio	9800am	
2050	2100		Vatican City, Vatican Radio	4005eu	5885eu
			7250eu		
2051	2100		New Zealand, Radio NZ International		17675pa
2051	2200	DRM	New Zealand, Radio NZ International		15720pa
2051	2200	DRM	New Zealand, Radio NZ International		15720pa

2100 UTC - 4PM EST / 3PM CST / 1PM PST

2100	2120		Vatican City, Vatican Radio	4005eu	5885eu
			7250eu		
2100	2127		Czech Rep, Radio Prague	5930eu	9430va
2100	2130	mtwhfa	Albania, Radio Tirana	7510eu	9345na
2100	2130		Australia, ABC NT Katherine	2485do	
2100	2130		Australia, ABC NT Tennant Creek		2325do
2100	2130		Austria, AWR-Europe	9830af	
2100	2130	Sat	Canada, CBC NQ SW Service	9625na	
2100	2130		Cuba, Radio Havana Cuba	11760va	
2100	2130		Nigeria, Radio, National Svc/Abuja		7275do
2100	2130		USA, Voice of America	7595as	
2100	2130	DRM	Vatican City, Vatican Radio	9800ca	
2100	2145		USA, WYFR/Family Radio Worldwide		6915eu
			17535na	17555am	
2100	2157		China, China Radio International	5960eu	
			6135eu	7120eu 7190eu	7205af
			7225eu	7285eu 7325af	9600eu
			11640af	13630af	
2100	2157		Germany, Deutsche Welle	13780af	
2100	2159		Germany, Deutsche Welle	7280af	
2100	2200		Angola, Radio Nacional de Angola		7217do
2100	2200		Anguilla, Worldwide Univ Network		11775am
2100	2200		Australia, ABC NT Alice Springs		2310do
			4835do		
2100	2200		Australia, Radio Australia	9500as	9660as
			11650pa	11660pa 11695as	12080as
			13630as	15515as	
2100	2200		Belarus, Radio Belarus Minsk	7135eu	7360eu
			7390eu		
2100	2200		Canada, CFRX Toronto ON	6070na	
2100	2200		Canada, CFVP Calgary AB	6030na	
2100	2200		Canada, CKZN St John's NF	6160na	
2100	2200		Canada, CKZU Vancouver BC	6160na	
2100	2200		Costa Rica, Worldwide Univ Network		13750va
2100	2200		Equatorial Guinea, Radio Africa		15190af
2100	2200		Germany, Deutsche Welle	9545af	11690af
2100	2200		Germany, Overcomer Ministries		6175eu
2100	2200		Guyana, Voice of Guyana	3291do	
2100	2200		India, All India Radio	7410eu	9445eu
			9910pa	9950eu 11620eu	11715pa
2100	2200	vl	Liberia, ELWA	4760do	
2100	2200		Malaysia, RTM/Traxx FM	7295as	
2100	2200		New Zealand, Radio NZ International		17675pa
2100	2200		Nigeria, Radio Nigeria/Kaduna	4770do	
2100	2200		Nigeria, Voice of Nigeria/Lagos		7255af
2100	2200		North Korea, Voice of Korea	7570eu	12015eu
2100	2200		Palau, T8WH/World Harvest	9930as	
2100	2200	vl	Papua New Guinea, Wantok R. Light		7325va
2100	2200		Russia, Voice of Russia	6145eu	7330eu
2100	2200	vl	South Africa, Channel Africa	3345af	
2100	2200		Syria, Radio Damascus	9330eu	
2100	2200		UK, BBC World Service	3255af	3915as
			5965as	5975as 6005af	6110af
			6190af	6195as 7445af	15400af
2100	2200	DRM	UK, BBC World Service	3995eu	
2100	2200		USA, Armed Forces Radio Network		4319usb
			5446usb	5765usb 6350usb	7811usb
			10320usb	12133usb	13362usb
2100	2200		USA, Voice of America	6080af	15580af
2100	2200		USA, WBCQ Monticello ME	15420am	
2100	2200	smtwhf	USA, WBCQ Monticello ME	7415am	
2100	2200		USA, WBOH Newport NC	5920am	
2100	2200		USA, WEWN Vandiver AL	11520me	
2100	2200		USA, WHRA Greenbush ME	7520af	
2100	2200		USA, WHRI Cypress Creek SC	7315sa	9525va
			11785na		
2100	2200		USA, WINB Red Lion PA	9265am	
2100	2200		USA, WRMI Miami FL	9955am	
2100	2200		USA, WTJC Newport NC	9370na	
2100	2200		USA, WWCR Nashville TN	7465na	9980na
			12160na		
2100	2200		USA, WWRB Manchester TN	9385va	
2100	2200		USA, WYFR/Family Radio Worldwide		5950na

			7430eu	9480af	9610af	12055af
			15115af			
2100	2200		Zambia CVC/ The Voice Africa	4965af		9420af
2115	2200		Egypt, Radio Cairo	6255eu		
2130	2156		Romania, R Romania International			6030eu
			6115na	7145na 9755na		
2130	2157		China, China Radio International			7160eu
			7325eu			
2130	2200		Australia, ABC NT Katherine	5025do		
2130	2200		Australia, ABC NT Tennant Creek			4910do
2130	2200	mtwhfa	Canada, CBC NQ SW Service	9625na		
2130	2200		Guam, KSDA/ AWR	9625as		
2130	2200		Lithuania, Mighty KBC Radio	6055eu		
2130	2200		Sweden, Radio Sweden	7390va		
2130	2200		Turkey, Voice of Turkey	7180va		
2130	2200		USA, Voice of America	7405as		

2200 UTC - 5PM EST / 4PM CST / 2PM PST

2200	2100	Sat/Sun	Spain, Radio Exterior Espana	6125eu	
2200	2225		Turkey, Voice of Turkey	7180va	
2200	2228		Lithuania, Mighty KBC Radio	6055eu	
2200	2228		Serbia, Intl Raido Serbia	6100eu	7200eu
2200	2230		India, All India Radio	7410eu	9445eu
			9910pa	9950eu 11620eu	11715pa
2200	2230		Japan, NHK World Radio Japan		13640va
2200	2230		South Korea, KBS World Radio		3955eu
2200	2230	w	USA, WBCQ Monticello ME	15420am	
2200	2235		New Zealand, Radio NZ International		17675pa
2200	2235	DRM	New Zealand, Radio NZ International		15720pa
2200	2245		Egypt, Radio Cairo	6255eu	
2200	2245		USA, WYFR/Family Radio Worldwide		17690af
2200	2257		China, China Radio International		5915as
			7170eu		
2200	2259	DRM	Canada, R Canada International		9800na
2200	2300		Anguilla, Worldwide Univ Network		6090am
2200	2300		Australia, ABC NT Alice Springs		2310do
			4835do		
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Creek		4910do
2200	2300		Australia, HCBJ Global	15525as	
2200	2300		Australia, Radio Australia	12010va	13630pa
			15230va	15240pa 15515as	17785pa
			17795va		
2200	2300		Belarus, Radio Belarus Minsk	7135eu	7360eu
			7390eu		
2200	2300		Bulgaria, Radio Bulgaria	6200eu	7400eu
2200	2300	smtwhf	Canada, CBC NQ SW Service	9625na	
2200	2300		Canada, CFRX Toronto ON	6070na	
2200	2300		Canada, CFVP Calgary AB	6030na	
2200	2300		Canada, CKZN St John's NF	6160na	
2200	2300		Canada, CKZU Vancouver BC	6160na	
2200	2300		Costa Rica, Worldwide Univ Network		13750va
2200	2300		Equatorial Guinea, Radio Africa		15190af
2200	2300		Guyana, Voice of Guyana	3291do	
2200	2300	vl	Liberia, ELWA	4760do	
2200	2300		Malaysia, RTM/Traxx FM	7295as	
2200	2300		Nigeria, Radio Nigeria/Kaduna	4770do	
2200	2300		Nigeria, Voice of Nigeria/Lagos		7255af
2200	2300	vl	Papua New Guinea, Wantok R. Light		7325va
2200	2300		UK, BBC World Service	5955as	5965as
			6110af	6135as 6155af	6195as
			9740as	15400af	
2200	2300		Ukraine, R Ukraine International		5830eu
2200	2300		USA, Armed Forces Radio Network		4319usb
			5446usb	5765usb 6350usb	7811usb
			10320usb	12133usb	13362usb
2200	2300		USA, Voice of America	5910va	6105va
			7220va	7405as 7425va	7480va
			9490va	11610va	
2200	2300	fs	USA, WBCQ Monticello ME	7415am	
2200	2300		USA, WBOH Newport NC	5920am	
2200	2300		USA, WEWN Vandiver AL	11520me	
2200	2300		USA, WHRA Greenbush ME	7520af	
2200	2300		USA, WHRI Cypress Creek SC	9615na	11785na
2200	2300		USA, WINB Red Lion PA	9265am	
2200	2300		USA, WRMI Miami FL	9955am	
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCR Nashville TN	5070na	7465na
			9980na		
2200	2300		USA, WWRB Manchester TN	9385na	
2200	2300		USA, WYFR/Family Radio Worldwide		5950na
			7285af	9620eu 11740na	15440am
			17690af		
2200	2300		Zambia CVC/ The Voice Africa	4965af	
2230	2245	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie		6240na
2230	2257		Czech Rep, Radio Prague	5930na	9435af
2230	2300		Guam, KSDA/ AWR	15320as	

2230	2300	Sweden, Radio Sweden	5850va	
2230	2300	USA, Voice of America	7230va	9780va
		15445va		
2236	2300	New Zealand, Radio NZ International	15720pa	
2236	2300	New Zealand, Radio NZ International	17675pa	
2245	2300	India, All India Radio	9705eu	9950as
		11620as	11645as	13605as

2300 UTC - 6PM EST / 5PM CST / 3PM PST

2300	0000	Anguilla, Worldwide Univ Network	6090am	
2300	0000	Australia, ABC NT Alice Springs	2310do	
		4835do		
2300	0000	Australia, ABC NT Katherine	5025do	
2300	0000	Australia, ABC NT Tennant Creek	4910do	
2300	0000	Australia, HCJB Global	15525as	
2300	0000	Canada, CBC NQ SW Service	9625na	
2300	0000	Canada, CFRX Toronto ON	6070na	
2300	0000	Canada, CFVP Calgary AB	6030na	
2300	0000	Canada, CKZN St John's NF	6160na	
2300	0000	Canada, CKZU Vancouver BC	6160na	
2300	0000	China, China Radio International	9800ca	
2300	0000	China, China Radio International	5990sa	
		6020na	6040nana	skd0209naskd0109
		Costa Rica, Worldwide Univ Network	13750va	
2300	0000	Cuba, Radio Havana Cuba	9550sa	
2300	0000	Egypt, Radio Cairo	6850na	
2300	0000	Guyana, Voice of Guyana	3291do	
2300	0000	India, All India Radio	9705eu	9950as
		11620as	11645as	13605as
2300	0000	Iran, VOIRI/IRIB	6010eu	7320eu
		9855af	11695af	
2300	0000	Malaysia, RTM/Traxx FM	7295as	
2300	0000	New Zealand, Radio NZ International	15720pa	
2300	0000	New Zealand, Radio NZ International	17675pa	
2300	0000	Papua New Guinea, Wantok R. Light	7325va	
2300	0000	UK, BBC World Service	3915as	5955as
		5965as	6000as	6135as
		9570as	9740as	11955as
2300	0000	USA, Armed Forces Radio Network	4319usb	
		5446usb	5765usb	6350usb
		10320usb	12133usb	13362usb
2300	0000	USA, Voice of America	6105va	7220va
		7265va	7405va	7480va
		11610va		
2300	0000	USA, WBCQ Monticello ME	7415am	
2300	0000	USA, WBOH Newport NC	5920am	
2300	0000	USA, WEWN Vandiver AL	11520me	
2300	0000	USA, WHRA Greenbush ME	5850eu	
2300	0000	USA, WHRI Cypress Creek SC	7315sa	5875na
		7335na	9615na	
2300	0000	USA, WRMI Miami FL	9955am	
2300	0000	USA, WTJC Newport NC	9370na	
2300	0000	USA, WWCR Nashville TN	5070na	7465na
		9980na		
2300	0000	USA, WWRB Manchester TN	5050na	5745va
		6890va	9385va	
2300	0000	USA, WYFR/Family Radio Worldwide	5950na	
		9430sa	15400sa	15440am
2300	0000	Zambia CVC/ The Voice Africa	4965af	
2300	2305	Liberia, ELWA	4760do	
2300	2315	Nigeria, Radio Nigeria/Kaduna	4770do	
2300	2330	Australia, Radio Australia	9660as	12010pa
		12080pa	13690pa	15230va
		17785va	17795va	
2300	2330	USA, Voice of America	6180va	7460va
		11840va		
2300	2345	USA, WYFR/Family Radio Worldwide	11740na	
2300	2345	Vatican City, Vatican Radio	7370am	
2300	2355	Turkey, Voice of Turkey	5960va	
2300	2356	Romania, R Romania International	6015eu	
		6115eu	7105eu	9610na
2300	2357	China, China Radio International	5915as	
		6145as	7180as	7350eu
		11790as		
2305	0000	Canada, R Canada International	9755na	
2315	2330	Croatia, Voice of Croatia	3985eu	7375sa
2315	2330	Moldova, Radio PMR/Pridnestrovie	6240na	
2330	0000	Australia, Radio Australia	9660as	12010as
		12080as	13690as	15415as
		17750va	17795va	
2330	0000	UK, BBC World Service	6170as	
2330	0000	USA, Voice of America	6180va	7460va
		11655va	11840va	13640va
2330	0000	USA, WBCQ Monticello ME	7415am	
2330	2357	Czech Rep, Radio Prague	5930na	7345na
2330	2358	Vietnam, Voice of Vietnam	9840as	12020as

MT ENGLISH LANGUAGE SHORTWAVE STATION RESOURCE GUIDE

Albania, Radio Tirana	http://rtsh.sil.at/
Angola, Radio Nacional de Angola	www.rna.ao/
Anguilla, Worldwide Univ Network	www.worldwideuniversitynetwork.com/
Argentina, RAE	www.radiocnacional.gov.ar/rae/rae.asp
Australia, ABC NT Alice Springs	www.abc.net.au/radio/
Australia, ABC NT Katherine	www.abc.net.au/radio/
Australia, ABC NT Tennant Creek	www.abc.net.au/radio/
Australia, CVC International	www.christianvision.com/
Australia, HCJB Global	www.hcjb.org/
Australia, Radio Australia	www.abc.net.au/ra/
Austria, AWR Europe	www.awr2.org/
Austria, Radio Austria Intl	http://oe1.orf.at/service/international
Bahrain, Radio Bahrain	www.radiobahrain.net/
Bangladesh, Bangla Betar	www.betar.org.bd/
Belarus, Radio	www.radiobelarus.tv.by/eng/
Bhutan, BBS	www.bbs.com.bt/
Bulgaria, Radio	www.bnr.bg/
Canada, CBC NQ SW Service	www.cbc.ca/north/
Canada, Radio Canada Intl	www.rcinet.ca/
China, China Radio Intl	www.cri.cn/
Costa Rica, Worldwide Univ Network	www.worldwideuniversitynetwork.com/
Croatia, Croatian Radio	www.hrt.hr/
Cuba, Radio Havana	www.radiohca.cu/
Czech Rep, Radio Prague	www.radio.cz/en/
Finland, Overcomer Ministries	www.overcomerministries.org
France, Radio France Intl	http://rfienglish.com
Germany, AWR Europe	www.awr2.org/
Germany, CVC Intl/Voice Africa	www.christianvision.com/
Germany, Deutsche Welle	www.dw-world.de/
Germany, Overcomer Ministries	www.overcomerministry.org/
Germany, Pan American BC	www.radiopanam.com/
Germany, The Overcomer Ministries	www.overcomerministry.org/
Germany, TWR Europe	www.twr.org/
Greece, Voice of Greece	www.voiceofgreece.gr/
Guam, AWR/KSDA	www.awr2.org/
Guam, TWR/KTWR	www.twr.org/
Guyana, Voice of	http://voiceofguyana.com/
India, All India Radio	www.allindiaradio.org/
Indonesia, Voice of Indonesia	www.vri-online.com/
Iran, Voice of the Islamic Rep of Iran	www.2.irib.ir/worldservice/
Italy, IRRS	www.nexus.org
Japan, NHK World/Radio Japan	www.nhk.or.jp/english/
Jordan, Radio	www.rtvjo.rj/index.php
Latvia, Radio SWH	www.radioswh.lv/index.php
Liberia, ELWA	www.elwaministries.org/
Liberia, Star Radio	www.radioswh.lv/index.php
Libya, Voice of Africa	www.libc.net/home.php
Lithuania, Radio Vilnius	www.lrt.lt/
Malaysia, RTM/Traxx FM	www.traxxfm.net/index.php
Malaysia, RTM/Voice of Malaysia	http://202.190.233.9/vom/utama.htm
Monaco, TWR Europe	www.twr.org/
Nepal, Radio Nepal	www.radionepal.org/
Netherlands, Radio Netherlands	www.radioneetherlands.nl/
New Zealand, Radio NZ Intl	www.rnz.com
Nigeria, Radio, Natl Svc/Abuja	http://radionigeriaonline.com
Nigeria, Radio/Kaduna	http://radionigeriaonline.com
Nigeria, Voice of/ Ext. Svc Lagos	www.voiceofnigeria.org
Oman, Radio Oman	www.oman-tv.gov.om
Pakistan, Radio	www.radio.gov.pk
Papua New Guinea, NBC	www.nbc.com.pg/
Papua New Guinea, Wantok R. Light	http://wantokradio.net/
Philippines, Radio Pilipinas	www.radiopilipinas.com/
Poland, Polish Radio	www.polskieradio.pl/zagranica/gb/
Romania, Radio Romania Intl	www.rrl.ro/
Russia, Voice of Russia	www.vor.ru/world.html
Saudi Arabia, BSKSA	www.saudiradio.net/
Slovakia, Radio Slovakia Int	www.rsi.sk
Solomon Islands, SIBC	www.sibconline.com.sb/
South Africa, AWR Africa	www.awr2.org/
South Africa, Channel Africa	www.channelafrica.org
South Africa, Trans World Radio	www.twr.org/
South Korea, KBS World Radio	http://rki.kbs.co.kr/english/
Spain, Radio Exterior Espana	www.ree.rne.es/
Sri Lanka, SLBC	www.slbc.lk
Swaziland, Trans World Radio	www.twr.org/
Sweden, Radio	www.sr.se/rs/english/
Syria, Radio Damascus	www.rtv.gov.sy/
Taiwan, Radio Taiwan Intl	http://english.rti.org.tw/
Thailand, Radio	www.hsk9.com/
Turkey, Voice of	www.trt.net.tr
UK, BBC World Service	www.bbc.co.uk/worldservice/
UK, Bible Voice BC	www.biblevoice.org/
UK, FEBA	www.feba.org.uk
UK, Sudan Radio Service	www.sudanradio.org/
Ukraine, Radio Ukraine Intl	www.nrcu.gov.ua/
USA, American Forces Radio	http://myafn.dodmedia.osd.mil/
USA, KNLS Anchor Point AK	www.knls.org/
USA, KTBN Salt Lake City UT	www.tbn.org/
USA, KWHR Naalehu HI	www.whr.org/
USA, Voice of America	www.voanews.com/
USA, WBCQ Monticello ME	www.wbcq.com/
USA, WBOH Newport NC	www.fbnradio.com/
USA, WEWN Vandiver AL	www.ewtn.com
USA, WHRA Greenbush ME	www.whr.org/
USA, WHRI Cypress Creek SC	www.whr.org/
USA, WINB Red Lion PA	www.winb.com/
USA, WRMI Miami FL	www.wrmi.net/
USA, WTJC Newport NC	www.fbnradio.com/
USA, WWCR Nashville TN	www.wwcr.com
USA, WWRB Manchester TN	www.wwrb.org/
USA, WYFR/Family Radio Worldwide	www.worldwide.familyradio.org
Uzbekistan, CVC International	www.christianvision.com/
Vatican City, Vatican Radio	www.vaticanradio.org
Vietnam, Voice of Vietnam	www.vov.org.vn
Yemen, Rep of Yemen Radio	www.yemenradio.net
Zambia, CVC Intl/Christian Voice	www.christianvision.com/

MILITARY DEMONSTRATION TEAMS 2009 AIRSHOW SCHEDULE

Dates	Group: Locations	Website
March 14	BA: NAF El Centro, CA - El Centro Air Show 2009 https://www.cnmc.navy.mil/elcentro/airshow/index.htm	
March 17	TB: Creech AFB, NV - Creech AFB Air Show http://www.creech.af.mil/	
March 18-21	GK: Panama City, FL/South Padre Island, TX	
March 21-22	BA: Punta Gorda, FL - 2009 Florida International Air Show http://www.floridaairshow.com/	
March 28-29	TB: Luke AFB, AZ - Luke Days 2009 http://www.luke.af.mil/ BA/GK: Tyndall AFB, FL - Era of Airpower Air Show http://tyndall.schultzairshows.com/ TB: MacDill AFB, FL - MacDill Airfest 2009 http://www.macdill.af.mil/	
April 4-5	GK: Kill Devil Hills, NC BA/GK: Tuscaloosa, AL - Tuscaloosa Air Show http://www.ci.tuscaloosa.al.us/index.asp?NID=846 TB/GK: Keesler AFB, MS - Thunder on the Bay http://www.keesler.af.mil/	
April 18-19	BA/GK: NAS Corpus Christi, TX - NAS Corpus Christi Air Show 2009 http://www.airshownetwork.com/show.php?id=282	
April 25-26	TB/GK: Ceiba, PR - Puerto Rico Air Extravaganza BA/GK: Seymour Johnson AFB, NC - 2009 Wings Over Wayne http://www.wingsoverwaynearshow.com/ TB: Langley AFB, VA - AirPower over Hampton Roads http://www.langley.af.mil/ GK: Lakeland, FL - EAA Sun 'n Fun Fly-IN http://www.sun-n-fun.org/content/	
May 2	SB: CFB Moose Jaw, SK - 15 Wing Moose Jaw Air Show	
May 2-3	BA: NAS/JRB New Orleans, LA - Nawlins Air Show 2009 TB/GK: Robins AFB, GA - 2009 Robins Air Show http://www.robins.af.mil/ GK: Terre Haute, IN - Terre Haute Air Fair http://www.terrehauteairfair.com/	
May 6	SB: Wahpeton, ND - Snowbirds over Wahpeton 2009	
May 9-10	TB/GK: Branson, MO - Branson Air Show http://bransonairshow.com/ GK: Cape Girardeau, MO - Cape Girardeau Regional Air Festival http://www.capeairfestival.com/ SB: Barksdale AFB, LA - Defenders of Liberty Open House & Air Show	
May 16-17	BA: MCAS Beaufort, SC - Blues Over Beaufort http://www.beaufortairshow.com/	

	TB/GK: Andrews AFB, MD - Joint Services Open House Air Show http://www.andrews.af.mil/ GK: Augusta, GA SB: MCAS Cherry Point, NC - MCAS Cherry Point Air Show BA/GK: NAS Patuxent River, MD - NAS Patuxent River Air Show 2009 TB/GK: Wantagh, NY (Jones Beach) - Bethpage Federal Credit Union New York Air Show at Jones Beach http://www.jonesbeachairshow.com/ SB: Rimouski, PQ - Rimouski Air Show 2009 TB: USAF Academy, CO - Air Force Academy Graduation Ceremony http://www.usafa.af.mil/index.cfm?catname=AFA%20Homepage
May 23-24	SB: Kingston, ON - Kingston Air Show BA/GK: Janesville, WI - Southern Wisconsin AirFEST http://www.swairfest.org/ TB: Ellsworth AFB, SD - Dakota Thunder http://www.ellsworth.af.mil/ and http://www.dakotathunder.com/index.html SB/GK: Rochester, NY - Rochester International Air Show BA/GK: Indianapolis, IN - Indianapolis Air Show http://www.indyairshow.com/ TB: Hill AFB, UT - Air Force Week/Hill AFB Open House & Air Show http://www.hillairshow.com/ and http://www.hill.af.mil/ GK: Rockford, IL - Rockford Air Fest SB: Portage, MI - Portage Air Show 2009 HF: Manitowoc, WI - Thunder on the Lakeshore (Manitowoc) SB: Sault Ste. Marie, ON BA: Denver, CO - Front Range Air Show '09 http://www.rmrfi.org/airshow.htm TB/GK: Ocean City, MD - OC Air Show http://www.ocairshow.com/ SB: CFB Bagotville, PQ - Bagotville International Air Show SB: Baddeck, NS - Baddeck Air Show BA: Pittsburgh, PA - Wings Over Pittsburgh http://www.wingsoverpittsburgh.com/ TB: Dover AFB, DE - Dover AFB Air Show http://www.dover.af.mil/ GK: Quad Cities, IA - Quad City Air Show http://www.quadcityairshow.com/ GK: Sanford, NC SB: St. Thomas, ON - Wings and Wheels Airshow SB: Orillia, ON - Orillia Air Show (fundraiser on behalf of the Community Foundation of Orillia and Area) BA/SB: North Kingstown, RI - Rhode Island National Guard Open House & Airshow TB/GK: Helena, MT - Helena Area Montana Military Open House and Air Show GK: Charleston, SC - Charleston AFB Air Expo GK: Dubuque, IA - Dubuque Air Show & Fireworks BA/GK: Binghamton, NY - Greater Binghamton Air Show TB: Battle Creek, MI - 2009 Battle Creek Field of Flight Air Show and Balloon Festival http://www.bcballoons.com/ SB: CFB Trenton, ON - 8 Wings Anniversary Weekend Air Display TB: Peoria, IL - Prairie Air Show® 2009 http://www.prairieair.org/ BA: Detroit, MI GK: Gary, IN - South Shore Air Show BA: Pensacola Beach, FL - Pensacola Beach Air Show http://www.visitpensacolabeach.com/what/airshow.asp SB: Peace River, AB - Peace River Regional Air Show TB/GK: Dayton, OH - Dayton Air Show 2009 http://www.usats.org/
May 27	
May 30-31	
June 6-7	
June 9	
June 10	
June 13-14	
June 17	
June 20-21	
June 24	
June 27-28	
July 3-5	
July 4-5	
July 10-11	
July 11-12	
July 18	
July 18-19	



DoD Photo

DEMONSTRATION GROUP ABBREVIATIONS

BA US Navy Blue Angels
GK US Army Golden Knights
HF Heritage Flight
SB Canadian Forces Snowbirds
SH Canadian Skyhawks
SW US Army Silver Wings
TB US Air Force Thunderbirds

ABBREVIATIONS

AFB Air Force Base
ARB Air Reserve Base
CFB Canadian Forces Base
EAA Experimental Aircraft Association
MCAS Marine Corps Air Station
NAF Naval Air Facility
NAS Naval Air Station
TBD To Be Determined

July 19 **SB:** Fort St. John, BC - 2009 Fort St. John Airshow
July 22 **TB:** Cheyenne, WY - Cheyenne Frontier Days Thunderbirds Air Show
<http://www.cfdrodeo.com/the%20celebration/more%20events/off-park/airshow.aspx>
SB: Airdrie, AB - Airdrie Air Show (Town Centennial Celebration)
July 25 **SB:** Lethbridge, AB - Alberta International Air Show
July 25-26 **BA:** Sioux Falls, SD - Power of the Prairie <http://www.siouxfallsairshow.com/>
TB/GK: Milwaukee, WI - Milwaukee Air Expo
<http://www.milwaukeeairexpo.com/>
SB: Prince George, BC - Prince George Air Show
BA: Seattle, WA - KeyBank Air Show at Seafair
<http://www.seafair.com/events/airshow/>
SB: CFB Cold Lake, AB - Cold Lake Air Show - Centennial of Flight
August 5 **SB:** Penticton, BC - Penticton Air Fair
August 7-9 **SB:** Abbotsford, BC - Abbotsford International Air Show
August 8-9 **BA:** Salinas, CA - California International Air Show
<http://www.salinasairshow.com/index1.htm>
TB: Vienna, OH (Youngstown ARB) - Youngstown Air Reserve Station Open House
August 15-16 **TB/GK:** Chicago, IL - Chicago Air and Water Show
SB: Saskatoon, SK - Canada Remembers International Air Show
August 19 **TB/GK:** Atlantic City, NJ - Thunder Over the Boardwalk
<http://www.atlanticcitynj.com/acaairshow.aspx>
August 22-23 **BA:** Fargo, ND - Fargo AirSho 2009 <http://www.fargoairsho.com/>
TB: Selfridge ANGB, MI - Selfridge Air Show
<http://www.selfridgeairshow.org/home.htm>
GK: Kansas City, MO - KC Aviation Expo
SB: St. Johns, NF
SB: Gaspe, PQ
SB/SH: Windsor, ON - Windsor International Air Show
BA: Offutt AFB, NE - Defenders of Freedom Air Show
<http://www.offuttairshow.com/>
TB/GK: Hillsboro, OR - Hillsboro Air Show <http://www.oregonairshow.com/>
SB: Brantford, ON - Brantford Air Show
BA/SB: Toronto, ON - Canadian International Air Show
TB/GK: Cleveland, OH - Cleveland National Air Show
<http://www.clevelandairshow.com/>
BA: NAS Fallon, NV - Fallon Air Show
TB/GK: Sacramento, CA - California Capital Air Show
<http://www.californiacapitalairshow.com/>
SB: Yarmouth, NS - Nova Scotia International Air Show
September 2 **TB:** Far East Tour - Note: At this point the cities in the Far East have not been finalized yet except for South Korea (Oct.23-25)
September 5-7 **BA:** Reno Stead Fields, NV - Reno Air Races
<http://www.airrace.org/indexJS.php>
TB: Hickam AFB, HI - Hickam Air Show <http://www2.hickam.af.mil/>
SB/GK: Scott AFB, IL - Scott Air Show
BA/GK: Redding, California - Redding Air Show
<http://www.reddingairshow.com/>
SB: Colorado Springs, CO - In Their Honor Air Show
SB: San Diego, CA
BA/GK/SB: MCAS Miramar, San Diego, CA - MCAS Miramar Air Show
<http://www.miramairshow.com/>



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GK: Cocoa Beach, FL - Cocoa Beach Air Show
October 10-11 **GK:** Peachtree City, GA - The Great Georgia Airshow
October 10-12 **SB:** Sheppard AFB, TX - Sheppard AFB Air Show
BA: San Francisco, CA - Fleet Week San Francisco 2009
<http://www.military.com/fleetweek>
October 14 **SB:** NAS Pensacola, FL
October 17-18 **BA:** NAS Oceana, VA - 2009 NAS Oceana Air Show
<http://www.oceanairshow.com/>
GK/SB: Cape Canaveral/Kennedy Space Center, FL - Air-Space Expo
October 23-25 **TB:** Osan AB, Korea - Osan AB Air Power Day
October 24-25 **BA/GK:** Fort Worth, TX - Spirit of Freedom Air Show
<http://www.allianceairshow.com/>
GK: Pinehurst, NC
October 31-November 1 **BA/GK/HF:** Houston, TX - Wings Over Houston
<http://www.wingsoverhouston.com/>
November 7-8 **BA:** Jacksonville Beach, FL - Jacksonville Sea and Sky Spectacular
<http://www.coj.net/Departments/Recreation+and+Community+Services/Special+Events/Sea+and+Sky+Spectacular/default.htm>
November 13-14 **TB:** Homestead ARB, FL - Homestead Air Show
BA: NAS Pensacola, FL - NAS Pensacola Blue Angels Homecoming 2009
<http://www.airshownetwork.com/show.php?id=76>
November 14-15 **TB:** Nellis AFB, NV - Aviation Nation <http://www.nellis.af.mil/>

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A Cloudy Future for the IWN?

For several years now I have been updating federal monitoring fans on the progress of the Justice Department's Integrated Wireless Network project. To review, this is a proposed nationwide VHF trunked system that is planned to provide the Justice Department and other federal agencies with a seamless voice and data communications system.

The original system was proposed for the Department of Justice, but the Treasury Department soon merged forces in the early stages of planning. In 2004, after three years of work on the project, the Department of Homeland Security was brought in to the alliance that was to be the federal IWN.

I have been fortunate to live in the area where the IWN pilot project was first tested and is now in day-to-day use by many federal agencies in the Seattle, Portland, and Pacific Northwest areas of the US. It has been an interesting exercise in figuring out where the various trunked repeater sites are located and trying to figure out who is using the system when most transmissions are encrypted!

However, things are now looking murky for the future of the IWN project. Some business publications are actually claiming the IWN is dead and abandoned, but that is simply not true. The IWN P-25 digital trunked system is in use every day by many agencies. But it does appear that the original concept of a nationwide, single-system for these federal agencies may be in jeopardy.

❖ The GAO IWN Report

There have been at least two reports on the progress of the IWN project issued by various government agencies. The first, done by the Justice Department's Office of the Inspector General and issued in March of 2007, mentioned many of the operational and technical problems being faced by the IWN project at the time. The report can be found here: www.usdoj.gov/oig/reports/OBD/a0725/final.pdf

In December of 2008, the Government Accountability Office (GAO) offered a report on the progress of the IWN and found some major problems. You can read the full report here:

www.gao.gov/new.items/d09133.pdf

The GAO report found a major obstacle to the IWN was the lack of cooperation between the various agencies that had originally signed on to the project. According to the GAO, while the Justice Department is working towards



getting the IWN expanded and deployed, the Department of Homeland Security is going off on their own to update and expand their current radio communications systems. And the report describes the Treasury Department as taking a somewhat passive role in the IWN program. So the project appears to be drifting from the original goals without cooperation and leadership from the participating agencies.

A couple of additional items of interest are contained in the GAO report:

First, it acknowledges that in the pilot project, located in the Pacific Northwest, several components of the Department of Justice (DOJ) and Homeland Security (DHS) are not able to utilize the IWN system, primarily due to system coverage issues. The GAO admits that the original goal of a nationwide, interconnected trunked system for the IWN may not be the best solution for the various federal agencies. The IWN may be modified to a hybrid of conventional and trunked radio sites to meet the needs of its users.

Despite the original agreement of cooperation on the IWN, the agencies have been actively working on expanding and updating their legacy, conventional radio systems. The Justice Department is pursuing what it calls the *Law Enforcement Wireless Communications Solution* (more on that later).

Since 2005, Customs and Border Protection division of DHS is proceeding with what they are calling the *Tactical Communications Modernization Project*. This includes the move towards P-25 digital radios and repeaters along the northern and southern US borders. I'll have more on this later in the column also.

The GAO report urges Congress to get all the appropriate parties together to a common goal on the IWN project.

❖ The Justice Communications Budget

Despite the negative news contained in the GAO report, the FBI appears eager to continue with the deployment of the IWN project. In December of 2008, the Justice Department released their Law Enforcement Wireless Communications Fiscal Year 2009 Performance Budget. This document can be found here:

www.usdoj.gov/jmd/2009justification/office/fy09-twlec-justification.doc

This budget report offers some interesting insights into what you might be hearing on some federal frequencies in the near future. The Justice Department is still actively pursuing the IWN project as its ultimate goal, but it needs to update communications systems that are not yet part of the IWN project. So they have decided to start upgrading sites of the legacy VHF FBI radio system to be ready when the IWN system grows.

Phase 1 of the Law Enforcement Wireless Communications Solution is to add several P-25 narrowband repeaters alongside the existing FBI analog repeater sites. Phase 2 would include the startup of small, trunked systems in the major areas of DOJ operations that would supplement and ultimately replace the conventional repeater sites. Phase 3 involves adding secure features to what the DOJ calls CWS or Commercial Wireless Services (smart phones, PDA, etc.). And Phase 4 suggests the expansion of secure broadband data along with upgrading of DOJ surveillance technology.

As I mentioned in the January *Fed Files*, some areas of the country have already begun to see new P-25 digital sites and frequencies being used by the FBI, US Marshals and perhaps other DOJ agencies. So keep searching the VHF federal band for new digital activity in your area. The Justice Department is seeking to expand the IWN trunked sites in the Washington DC area, so keep an eye out for changes there.

❖ The DEA Situation

One prominent item in the Justice Department budget report is some discussion about the Drug Enforcement Administration (DEA)



and what to do about upgrading their communications systems.

For years now, there have been rumors of the DEA migrating off of their much-used UHF frequencies to a singular VHF system with other Justice Department agencies. I have heard from listeners across the country that DEA channels were completely silent and others told me that DEA repeater sites were abandoned and equipment removed. In the Pacific Northwest, where the IWN trunked system is in operation, I can confirm that the DEA has moved off of their UHF channels for the most part. However, the DEA has complained often about their coverage on the IWN system.

The DOJ budget specifically states that it is not practical or feasible to convert DEA radio communications to VHF. This apparently has been tried and found to be "operationally unworkable" due to the way the DEA operates its surveillance and task forces. So the DOJ is asking for funding to upgrade the DEA to narrowband P-25 radios across the country. Some areas have already been heard using P-25 digital mode, but most areas are still heard in analog.

The DEA uses a fairly standard nationwide radio channel plan in the federal UHF band, although some local operations often utilize specialized tactical frequencies. You will notice that there are specific channels set aside for HIDTA operations. HIDTA stands for High Intensity Drug Trafficking Area and is a program that concentrates resources on major drug trafficking areas in the United States. HIDTA operations normally involve federal support of local police operations that are involved in drug enforcement. You can find out more about the HIDTA program at the DEA web site, www.usdoj.gov/dea/programs/hidta.htm.

Here is the most recent DEA frequency list that I have compiled. Since it appears that the DEA is going to continue to operate on these UHF frequencies, I thought it would be a good idea to publish them again.

408.2750
408.3000
408.3750
411.1250 – input to 419.2500
411.1750
412.0000 – HIDTA Ch 6
412.1250 – HIDTA Ch.10
412.4500
412.4750
412.5250 – input to 414.5500
413.6250
413.6750
413.7000
413.7500
413.9750 – input to 417.7500 & 419.2250
414.0000 – simplex
414.0250 – HIDTA Ch.3 simplex
414.0500 – HIDTA Ch.4 simplex
414.0750
414.1250
414.1500 – HIDTA Ch.5 simplex
414.1750
414.2000
414.2250



414.2750
414.3250
414.3500 – HIDTA Ch.7
414.4000
414.4250 – input to 419.2750
414.4500 – HIDTA Ch.8
414.4750 – HIDTA Ch.9
414.5000 – HIDTA Ch 2
414.5250 – input to 419.3000
414.5500 – HIDTA Ch 1
414.5750
414.6000 – input to 419.2000
415.5000
415.6000 – input to 418.8250
416.0500 – input to 418.6250
416.1000
416.1500
416.2000 – input to 418.9500
416.2750
416.3250 – input to 418.9000
416.3750 – input to 418.7750
417.0250 – input to 418.9750
417.0500
417.0750
417.1000
417.1250 – input to 412.0000
417.1500 – simplex
417.1750 – input to 412.1250
417.2000 – simplex
417.2750 – simplex
417.3250 – simplex
417.4000 – input to 419.0000
417.4500 – simplex
417.5000 – simplex
417.5500 – simplex, heard in NYC
417.7500
418.0000
418.0500 – simplex (federal itinerant)
418.0750 – Interagency Common
418.1250
418.1750 – simplex
418.2000 – simplex
418.2250 – simplex
418.3250
418.5000 – simplex
418.5750 – simplex (federal itinerant)
418.6250 – DEA Ch.1
418.6500 – simplex
418.6750 – DEA Ch.4 simplex
418.7000 – simplex
418.7500 – DEA Ch.3 simplex
418.7750 – simplex
418.8000 – simplex
418.8250 – DEA Ch.5
418.8500
418.8750 – simplex
418.9000 – DEA Ch.2
418.9250
418.9500 – DEA Ch.6
418.9750 – DEA Ch.8
419.0000
419.2000
419.2250 – simplex
419.2500
419.2750
419.3000
419.3250 – input to 414.3500
419.3750 – input to 414.4500
419.4000 – input to 414.4750
419.4250 – input to 414.5000
419.4500
419.5000 – Heard in Las Vegas
419.5250 – DEA Ch.10

❖ Arizona Fedcom

The previously referenced GAO report mentions the DHS Customs and Border Protection Tactical Communications Modernization Project. This project includes the upgrading of CBP radio communications systems to P-25 digital. In late 2007, much of the Border Patrol

communications in southern Arizona switched from analog to digital, and in June of 2008, the Border Patrol along the northern Washington state border switched to P25. There are also reports of the Border Patrol using some talk groups on the IWN system, but conventional communications still seem to be in use.

I have compiled some of the changes that I monitored while in Arizona recently. I did notice that while the Border Patrol has switched to digital, most of the Customs radio systems are still running analog.

Frequency		User
162.0625	N001	CBP Border Patrol BP WEST repeater
162.3125	N001	CBP Border Patrol BP EAST repeater
163.2250	N301	CBP Customs DNET 30
163.6250	N001	CBP Border Patrol TELEGRAPH repeater
163.6500	N001	CBP Border Patrol AJO MTN repeater
163.6750	N001	CBP Border Patrol LOOK-OUT or OAT MTN repeater
163.7000	N001	CBP Border Patrol WHITE TANK repeater
163.7250	N001	CBP Border Patrol LEMON 1 repeater
163.7500	N001	CBP Border Patrol BERN 1 repeater
163.7750	N001	CBP Border Patrol DRAGON, FLORENCE or OAT MTN2 repeater
164.0500	N001	CBP Border Patrol CHILDS repeater
164.6000	100.0 pl	CBP Customs NET 5
165.2375	100.0 pl	CBP Customs NET 1
165.4125	100.0 pl	CBP Customs NET 32 repeater
165.9000	N001	CBP Border Patrol BENE 1 repeater
165.9750	N001	CBP Border Patrol RED repeater
166.3500	N111	Unknown possibly VAMC in Tucson
166.4625	N293	DHS Common
166.8500	N001	CBP Border Patrol GRAHAM repeater
167.0000	P-25	Unknown agency
167.1375	N001	CBP Border Patrol TAC W simplex
167.8250	N293	Unknown possibly VAMC in Tucson
168.6125	N001	CBP Border Patrol TAC E simplex
168.9000	N001	CBP Border Patrol MULE 2 repeater
168.9750	N001	CBP Border Patrol LEMON 2 repeater
169.4500	100.0	CBP Customs NET 2
170.3500	P-25	FBI and US Marshals
170.4875	P-25	FBI and US Marshals
170.6250	N001	CBP Border Patrol BERN2 repeater
171.2625	N293	VA Medical Center Tucson
171.3250	N001	CBP Border Patrol GROWLER repeater
172.2125	N167	FBI Tucson area
172.9000	N001	TSA at Tucson International Airport
173.6875	N001	CBP Border Patrol QUIJOT repeater

That's all for this month. Look for a federal communications wrap-up on the Presidential Inauguration and the Super Bowl in the next *Fed Files*. See you in May!

Reception Range? It Depends ...

"How far away does it pick up?" That's the most common question I'm asked by those who see me listening to a scanner, either at trackside or while traveling by train.

The answer, of course, is "It depends."

While I don't have the time to go into all the factors that can affect reception – signal strength of the transmitter, antenna size and location, terrain, and even atmospheric conditions – I give the following guidelines: My hand-held scanner with a short "rubber ducky" antenna will pick up most transmissions within 5-10 miles; my car-mounted scanner with its 12-volt power source and external magnetic mount antenna (optimized for the railroad band) picks up most transmissions up to about 20 miles – but sometimes much further.

While driving up along the crest of the Blue Ridge Mountains in western North Carolina, I have picked up both sides of a conversation (engine and yardmaster) at a yard some 40 miles away. But here I had the advantage of great elevation and a near line of sight – and the fact that both sides were using strong transmitters.

For the benefit of those who are just getting into scanning railroads or who have just developed an interest in railroads, let's look at

the basics involved in signal propagation and quality of reception.

❖ Believing in antennas

I've long been a believer in the importance of quality antennas suited to a particular job. This was reinforced many years ago, when I visited the office of a then locally based shortline with my scanner. The line's general manager asked me how far out I could pick up signals with my hand-held scanner. I think my reply at that time was "about five miles."

The railroad manager, with nothing better to do at the moment, said "let's try something." He plugged my scanner into the cable coming from the railroad's home base antenna mounted atop a 70 foot tower. Suddenly we were listening to engines switching at a yard about 20 miles away.

Of course, it's difficult to carry a 70 foot tower around with you.

Scanners have gotten better during the decades that have passed since that incident took place, but keep in mind that railroad radio transmissions are intentionally designed not to cover vast distances.

"Interoperability" is a current buzzword in radio communications. Railroads have long had that, meaning that almost anyone with a radio who works for a particular railroad can talk to anyone else from that railroad – within a reasonable distance. And, if necessary, employees from different railroads can also talk to each other.

All locomotives of major railroads have to be equipped with radios that can transmit and receive on all the AAR approved frequencies, as these locomotives sometimes remain on a train as it operates over the tracks of more than one railroad. Also, at junctions, at facilities where multiple railroads share tracks, or where railroads cross each other at grade, employees of one railroad frequently need to talk to dispatchers and employees of another railroad.

One of the more interesting conversations I monitored, while traveling in the Columbia River Gorge between Washington State and Oregon years ago, was between two signal

maintainers, one of whom worked for Union Pacific and the other for Burlington Northern (BN, now BNSF). One railroad runs on one side of the Columbia River, the other on the other side. But, the two interconnected (and still do) at Celilo, where a branch of the BN, known as the Oregon Trunk, crossed the Columbia from Wishram, Washington, and headed south into Oregon, crossing the UP on the south side of the river. So obviously, the two lines' signal systems had to interconnect at that point.

And, so the two signal maintainers knew each other and apparently were friends. Although railroad radio channels are supposed to be used only for railroad business, that day the two appeared to be just checking in with each other and seeing how things were going. I don't remember on which railroad's channel the conversation took place, but as there was no other activity in the area at the moment, they didn't impede any operations.

That conversation also underscored the fact that even competing railroads often have to cooperate with each other to get their work done – and not just on contractually shared trackage.

❖ Detours and "Pilots"

As already mentioned, trains that cover vast distances often operate over the tracks of more than one railroad. And, railroads sometimes lease locomotives to and from each other, as circumstances dictate. So, it's not unusual to find a locomotive consist at the head of a train with locomotives of more than one railroad.

But, there are also other circumstances where locomotives or entire trains of one railroad will show up unexpectedly on the tracks of another railroad.

The Association of American Railroads (AAR), the major trade group for the large North American railroads (and also the frequency coordinating body for those railroads), has a comprehensive and complex set of rules where, in emergencies or other special circumstances, one railroad can ask to detour its trains over the tracks of one or more other railroads.

These rules cover the compensation that the requesting railroad has to pay, but also specify that, short of physical impossibility, the other railroads are obligated to assist as best they can – because they may be in the same situation another time.

Emergencies can include natural disasters, such as flooding, or a landslide blocking a main line, or a derailment impeding the flow of traffic. Special circumstances include scheduled major



Far from its normal route through eastern North Carolina, Amtrak's Auto Train, which carries both passengers and their vehicles from Florida to northern Virginia, is creeping through Apex, N.C., on June 2, 2007. The train had been hit by a double dose of bad luck. A derailment on CSX in eastern North Carolina had closed its normal route and much of this detour route (diverting at Pembroke, N.C., to Hamlet, then north to Raleigh and back east to Selma, where it rejoined its normal route) had been temporarily restricted to 10 miles per hour by major track defects found during a federal inspection.

maintenance or construction work on a bridge or tunnel that requires closing a line for more than a day.

In those cases, the detouring railroad may have the assisting railroads move the trains with their own crews. Or, particularly for shorter detours, the detouring railroad may keep its own crews on the trains. That may necessitate the use of a "pilot" from the host railroad.

Railroad crews have to "qualify" on lines that they operate on. That means that a new (newly hired or new to that line) engineer or conductor has to work with an experienced counterpart for a set number of runs until he or she is fully familiar with the characteristics of the line.

Where railroads share tracks, both railroads have crews qualified to operate on that line. But, for a detour move where the detouring railroad does not have crews qualified for the detour route, the host railroad provides a pilot. (This is similar to the use of harbor pilots who assist ship crews navigating their way through a harbor.)

This person is a qualified employee of the host railroad, often a supervisor, such as a road foreman of engines or trainmaster (supervisor of conductors), who will ride with the detouring crew to make sure it is aware of all operating characteristics of the line.

The host railroad may have a limited number of employees that are available as pilots. So, during an emergency requiring detours, you may hear a train that is about to leave its own railroad report either to its own dispatcher or that of the host railroad that it is sitting at a junction awaiting the arrival of a pilot.

❖ Just enough distance

But, back to the idea that railroad radio signals are not really designed to go very far...

For safety, it is important for all railroad equipment and employees in a given area to be on the same frequency – and to be able to talk to each other. But, at the same time, you don't want a train traveling down a line to constantly be changing frequencies – nor to be interfering with communications of other trains miles away.

Remote base stations through which dispatchers talk to trains and workers on the ground are usually spaced about 20-40 miles apart, with slightly overlapping areas of coverage. The antennas for these remote base stations are usually on substantial towers to give them enough range.

That way, everyone in a given area can hear all transmissions, and, though there may sometimes be a brief delay for a train or employee to transmit, a train 30 or more miles away is not going to interfere with another train at the given location.

Talking defect detectors, which broadcast a verbal status report on equipment in a train as it passes (checking for hot bearings or dragging equipment), typically have a much shorter range of coverage, usually about five miles. They have lower power transmitters, and antennas are on low towers or structures.

The longest freight trains operated in the U.S. are in the range of 1.5 miles; most trains are shorter. A talking defect detector broadcasts its status message after the entire train has passed,

and repeats its message at least two times. So, by that time, the lead engine is going to be about two miles away.

❖ Directional antennas

However, an important factor that I haven't touched on yet that affects reception on your scanner is that railroads often use directional antennas on ground based stations, including on dispatcher remote base stations and talking detectors.

It is a very logical solution, as rail lines, though they may curve to follow terrain, run in a particular direction between cities. The trains and employees to whom dispatchers will be talking will always be along that rail corridor.

Even major rail yards are linear in form. Though such a yard may be four to five miles long, it will be less than half a mile in width, even if there are dozens of parallel tracks.

What does that mean to scanner listeners? The range you get on your scanner depends not just how far you are from the transmitting location, but also at what angle you are away from the rail corridor. If you are at trackside or following a rail corridor on a parallel road, you will get better reception than if you are several miles away – even if the distance from the transmitter location is the same.

If you monitor trains from your home or other fixed location, and you are either primarily interested in one railroad or there is only one railroad in the area, you can make the same technique work for you: consider a directional antenna to get maximum reception, particularly if you are close to the rail corridor.

If you want to listen to multiple railroads with lines in different directions, an omnidirectional antenna is still the best choice.



If you have direct line of sight, as in this view of the eastbound Amtrak's California Zephyr in western Colorado in 1999, even a small antenna on a hand-held scanner should give you good reception. This photo was actually made from several miles away with a long telephoto lens from a high vantage point.

❖ Next time

Next time, we'll look at additional railroad terminology, particularly as it relates to meets between trains – and we'll take a look back at major railroad developments during the past year, something I had planned to include this time before running out of space.

Books by Ernest H. Robl:

THE BASIC RAILFAN BOOK

UNDERSTANDING INTERMODAL

THE POWDER RIVER BASIN

Detailed descriptions at

<http://www.robl.w1.com>



Moments earlier, the track near Apex, N.C., was still occupied by a CSX track inspector, making sure the route was now safe for the detouring train. Alerted by a tip from a friend, I had headed south to try to spot the detouring train. Following the road on a closely paralleling road, I quickly located the train and had no problems following it northward – both visually and by radio.

Antenna Observations

Welcome to another issue of *Below 500 kHz*! Last month, we shared a backlog of reader mail that had been holding for quite awhile. We have two more letters to pass along this month, both of which bring some interesting points to light that should be useful to many listeners.

❖ Mystery Antenna

We begin with **Randy Ballard (N5WV)** who writes: "Last year I was traveling on I-49 from Lafayette, LA. to Alexandria, LA. and as a Mil-com fan, I decided to take a trip to Fort Polk Army Base in Leesville just to check out the communication activity. On my way, I noticed a dipole-type antenna system strung between two telephone poles. I turned around and got out to have a closer look. The station consisted of a small building roughly 10 x 15 feet and fenced with a locked gate. It had a warning sign that said FAAATC system or something like that – it was the standard sign. No other information was noted."

"The antenna consisted of two horizontal dipoles spaced 3 or 4 feet apart and running to two telephone poles spaced 75-100 ft apart. The antenna was fed with a single conductor cable coming from a matching device mounted behind the building. The single cable ran up towards the two horizontally spaced dipoles and at about three feet away the cable split and then connected to each dipole. This connection with the building was at the center of the antenna system so it was center fed. I've seen the beacons that are of a vertical structure with capacitance hat at sites paired with the 75 MHz V-beam antennas, but never one like this. I wanted to try and look it up but I'm still digging for my old copy of the *BeaconFinder*."

Hello, Randy, and thanks for writing to *Below 500 kHz*. The station you visited is almost certainly an older non-directional beacon (NDB) operating on longwave. Until the FAA

contracted with Scientific Radio Systems (SRS) in the mid-1980s for new-generation NDBs with top-hat vertical antennas, many beacons used the sort of wire antenna you describe. In fact, many are still in service (see Figure 1).

For state-by-state listings, I often turn to Skip Carden's *ADF Directory and Manual*. My 1990 edition lists 31 NDBs in Louisiana, and, although it's doubtful all of these are still active today, two distinct possibilities are: GUV/359 kHz (Fort Polk-Gator) or LKM/362 kHz (Lafayette-Lake Martin).

One trick you can use to ID a beacon in the future is to use your car's AM radio. When you are parked right next to a beacon, chances are you will be able to hear the ID at some setting on the AM dial, either by harmonics, or simple overloading of the receiver's front end. I've used this trick to identify beacons while on the road, at times when I am caught without my longwave receiver.

❖ Rediscovering Longwave

Allen Lutins (KC2KLC) also wrote in with the following letter: "After focusing primarily on monitoring for years, I recently got back on the air as a ham. All I used previously for an antenna was an end-fed longwire between my house and a nearby tree, but I wanted to avoid interference in my house and also provide a better match for my transceiver, so I erected a dipole made from two toy slinkies, slung across my backyard with a coax feed to my house. Since conditions on HF have been relatively poor lately, I decided the other night to give LF monitoring a whirl (hadn't done so in a while) using my new dipole, and I thought I'd share the results (and some lessons learned) with you."

"I have spent a fair amount of time monitoring longwave, but what a difference this antenna made! Two nights ago I logged 50 non-directional beacons I'd never heard before. I use the *LF/MF Radionavigation Station List* compiled by William Hepburn, at www.dxinfo.com/ndb.htm to identify a lot of my beacons. There was one that I couldn't ID, though: 'P&A' on 448 kHz. (Yes, it actually used the Morse Code sign for ampersand [· – · · ·]). I know CW, but I'd never come across that symbol before and had to look it

up. Any idea where that one is located? I know it's not Canadian, because it didn't have the long tone between the IDs. I suspect it is in the U.S., but not necessarily, since one of the NDBs I heard was in San Andres, Columbia (SPP).

"Having the antenna located well away from the house clearly helped in reducing interference. But I never could have pulled all those beacons out of the QRM and QRN without the help of digital signal processing software. The package I use, *SR5* (PC-based software from www.ar5.com), allows me to draw custom filters free-hand across the audio spectrum using my mouse. I draw notches where interfering signals occur, and like magic they all disappear and all I hear is the signal I'm homing in on. It's an invaluable tool for LF monitoring!

"Last night I turned my attention to DGPS stations, and bagged 15 that weren't in my log. I use *DSCDecoder* software (www.coaa.co.uk/dscdecoder.htm) to decode the IDs, and the DGPS station ID lookup tool at www.classaxe.com/dx/ndb/reu/index.php?mode=tools to determine their location. I also heard a couple of commercial European broadcasters in the mix. All in all, a great time monitoring LF in central New York State."

Thanks for writing, Allen. Your letter points out just how much there is to be heard on longwave if you have the right tools at hand. You list many useful resources in your letter, and I hope that other readers will explore these as they tune across the basement band. Table 1 shows your DGPS loggings. I'm drawing a blank on the mystery signal "P&A" on 448 kHz. There is a possibility that this is a keying error from a non-directional beacon. I invite any other readers who have heard it to write in with their reports.

Table 1. DGPS Loggings (From Central NY)

Freq.	Ref. ID	Location
286	310	Canada - ON - Warton
295	93	USA - WV - St Mary's
301	59	USA - MD - Annapolis
304	219	USA - WI - Mequon
309	317	Canada - QC - Lauzon
311	157	USA - IL - Rock Island
312	245	USA - FL - Tampa
313	320	Canada - QC - Moosie
314	105	USA - WI - Sturgeon Bay
315	338	Canada - NL - Cape Race
316	043	USA - ME - Brunswick
317	145	USA - TN - Hartsville
318	53	USA - TX - Summerfield
319	37	USA - GA - Savannah
320	161	USA - AL - Miller's Ferry
325	176	USA - ND - Medora

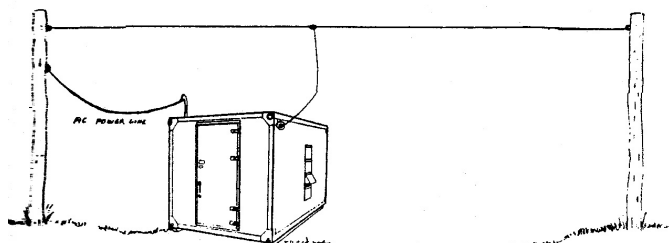


Figure 1. Many older beacons still use a wire antenna similar to the type shown here.

Pirates Week Podcast from Ragnar

We occasionally mention the excellent Pirates Week internet podcast, but this DX magazine program does not get the attention that it deserves. Ragnar Danneskjold of **Ragnar Radio** produces this excellent show. You can check it out at: www.podcastalley.com/podcast_details.php?pod_id=23535 or you can find it through a Google search.

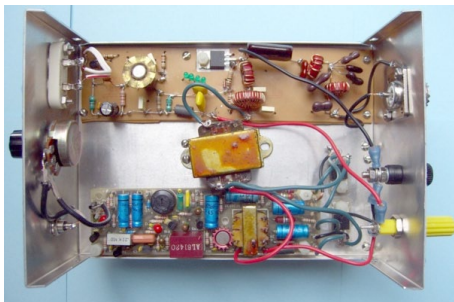
2009 WINTERFEST

Festmeisters John Figliozi and Richard Cuff announce that the 22nd annual Winter Shortwave Listener's Festival is scheduled for March 13 and 14 in Kulpsville, Pennsylvania, as usual. The event is held at The Inn at Towamencin in suburban Philadelphia. Sponsored by the North American Shortwave Association, the Fest remains the largest gathering of shortwave DXers in North America. It's always a lot of fun, and you will want to make your plans to attend this event.

Registration forms are available on the Fest web site at <http://swlfest.com/>. Hotel rooms are priced at \$85, with the Fest registration priced at \$65. As usual, the event will cover all aspects of radio monitoring, including pirate and clandestine radio station DXing. As in recent years you can expect to see many other topics covered, including digital broadcasting, scanning, and other dimensions of our fascinating hobby.

COMMANDO TRANSMITTER

This month we see an actual pirate transmitter. It is the "Commando" AM transmitter that is in use by **Channel Z Radio**. They report that this apparently simple transmitter has been effective. The station has received reports from Europe while using the transmitter from North America. Our thanks go to the station for forwarding this interesting example of radio transmitter technology.



CLANDESTINE QSLs

This month we give special mention to Wendel Craighead of Kansas. Wendel has one of the largest QSL collections of clandestine stations in the world. His recent success comes from sending reports to a number of clandestine programs that are broadcast via licensed relay transmitters in places such as Wertachtal, Germany. This technique is one you might want to copy. Its success comes from the fact that many political clandestine broadcasters have changed their strategy from the old days when we often did not know the transmitter location for the programs. (See last month's feature on *QSLing Brokered Broadcasts* for more on this technique - ed.)

NUMBERS ON 5882

Multiple DXers sent in logs this month of Spanish language numbers broadcasts around 5882 kHz. Have others been hearing these broadcasts?

WHAT WE ARE HEARING

Monitoring Times readers heard more than three dozen different pirate radio stations this month. You can hear them too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through typically used pirate radio frequencies to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on **6925 kHz**, plus or minus 30 or 40 kHz.

Ann Hoffer Radio- This station features Ann Hoffer singing songs composed by none other than Ann Hoffer. (None known)

Balls to the Wall Radio- Recent shows from them have largely been transmitter tests, so their format is uncertain. (ballstothewall@gmail.com)

Captain Morgan- The captain inserts TV audio from the old *Twilight Zone* show between his rock music tunes. (None, says to send loggings to the Free Radio Network web site)

Channel Z Radio- They have been more active lately with a rock music format. We see their transmitter here this month. (channelzradio@gmail.com and Blue Ridge Summit)

Di Dah Radio- Their distinguishing feature is that their identifications are provided in Morse code. (None)

Gospel for Antarctica- This one is a rock music and comedy pirate, and thus is not a religious station. (Stoneham)

KUSA- This one appears to transmit from the western

USA, and thus it represents good DX on the east coast. Try their nonstandard internet podcast at <http://kusaradio.com/> (none known)

Liquid Radio- Recent shows have supplemented rock music with techno dance music. They announce a new web site at <http://liquidradioonline.com/> on the internet. (wwrbfm@gmail.com)

MAC Shortwave- Around the holidays Paul Star added novelty music to his top 40 radio replica station. (macshortwave@yahoo.com)

Mystery Radio- The winter DX season is still here, so some are still hearing this Euro pirate on 6220 kHz on weekends near local sunset. (radio6220@hotmail.com)

NOEL- This holiday pirate with the odd call sign was on during the Christmas holiday, of course. (None announced)

Northwoods Radio- A "loon call" interval signal precedes their rock music "from the Great Lakes." (northwood-sradio@yahoo.com)

Outhouse Radio- Country music dominates their programming. (None known)

Radio Azteca- Bram Stoker's long running pirate combines comedy and Dxing, and thus he is very entertaining. (Belfast)

Radio Clandestine- Pirate radio nostalgia continues! Somebody has been relaying old R. F. Burns productions from this pioneering pirate station. Some think that this was the best pirate ever produced. (None current)

Radio Free Euphoria- Captain Ganja checked in this month about his drug advocacy pirate, and other DXers heard a show from him as well (Belfast)

Radio Mistletoe- Here's another Euro pirate that made it to North America on 6210 kHz. They are seasonal fare, but the area around this frequency is well worth checking on weekends near sunset for Euro pirates. (radiomistletoe@live.com)

Radio Morania- Somebody has been relaying this old classic pirate radio production more than once. It is the most famous parody of international broadcasting in history. (None)

Radio Jamba International- Pirate radio discussions are mixed with their rock music, either via a pirate transmitter or via a WBCQ relay. (Belfast)

Radio Pigmeat International- Despite their name, they play rock music with no coverage of the pork belly commodities exchange. (pigmeat_voab@yahoo.com)

Random Radio- Since their music format varies from broadcast to broadcast, this station is aptly named. (None, asks for reports to the Free Radio Network web site)

Sycko Radio- This veteran station features the classic pirate format of rock music and comedy. (syckoradio@yahoo.com)

Tangerine Radio- Several of Raunchy Rick's well produced old anarchist programs have been resurrected on the pirate bands with recent relays. (Belfast)

Todd Rundgren Radio- You get two guesses on which rock music artist dominates the music on this pirate. (None known)

Undercover Radio- Dr. Benway transmits rock music, pirate advocacy, and fables "from the middle of nowhere." Sometimes he experiments with techniques such as remote broadcasting. (Merlin and undercover-radio@gmail.com)

Underwear Mineral Radio- This oddly named rock music pirate employs a computer as its announcer. (None announced)

Victory Radio- This station appears in celebration whenever the University of Texas wins a big game. (None)

Continued on page 63

Living Large on a Tight Budget

As I have recently reiterated a number of times in a number of ways, we are living in "interesting times." The current state of the world's finances has implications for just about everyone. For many folks, the need to take care of necessities in life has pushed discretionary spending to the back burner. While some of the more rabid adherents to the ham radio hobby may object, I think it is safe to say that many amateur radio folks may be postponing hobby purchases in favor of things like...food perhaps?

Okay, okay, I know... All is not dour days and cold, dark nights. And, as I have reminded folks many times in this column, tenacity and resourcefulness trump expensive hardware every day of the week. You can put out a signal with a used transmitter you found at a hamfest for fifty dollars just as well as you can with a multi-thousand dollar contest rig that represents the latest and greatest the electronics industry has to offer.

If both of the aforementioned rigs shoot 100 watts out into the luminiferous ether by way of a similar antenna, that guy listening in far off Freedonia is going to hear the same signal and more than likely give the same signal report. Let's start from that point and try to find a way to enjoy the ham radio hobby in these tough and troubling times.

❖ Start With What You Have

When I was a newly minted ham back in the '70s, I had occasion to visit the shack of an OM who was able to brag of his Honor Roll status with over 300 entities in his log book. He had a high end Collins S-Line station with all the trimmings and a nice tribander sitting at 60 feet in the back yard. Very impressive.

However, what was more impressive was a glance at his log books. What I discovered there was truly inspirational. He got his first 50 or so countries with a 3rd hand Hallicrafters

S-38 receiver and a homebrew, two tube CW transmitter into a dipole. After that, he graduated to a Heathkit HW-101, a very reasonably priced rig in its day, and took his totals up to over 200 using the same dipole he had the previous station set up with. It was only later in his amateur radio history that his personal fortunes allowed him to set up a top of the line station. Most of his awards and successes were earned using very modest equipment.

Think of it this way: If your station cost you \$250 to put together, earning DXCC set you back two and a half bucks per contact. If your station cost \$5000, that same piece of wallpaper now cost you fifty dollars per country. On the whole, I find the efforts of the low dollar station much more indicative of the ham radio art.

So maybe you haven't wrung that last "best contact" out of your existing transceiver. What can you do to keep things keeping on until you really need to jump to a newer rig?

Break out the manual and give it a good reading. You may be surprised to find that there is a setting or a feature you forgot about that might improve performance. Most newer radios have so many functions that it is hard for even the most dedicated operator to keep track of them all.

If you have the skill or the interest, now is also the time to break out the shop manual and go over the alignment settings. Every rig deserves a good tweaking and cleaning at least once a year. It is the only way to assure you are sending out the best signal and hearing with the best ears your receiver offers to you. If you can't take on the task yourself, reach out to your compatriots in your local ham club.

Once the radio is up to snuff, follow along out to the antenna. How does your feedline look these days? What is the condition of the insulators? Is that copperweld you have strung up on the back forty flaking down to its steel core? A great radio can only really show what is has to offer if the antenna is at its best. Improving your antenna system is almost always your best ham radio investment. Wire is cheap, and there are some great simple antenna designs that can give you a few more dB of gain.

❖ Preowned is Preloved

Used equipment, carefully chosen and bought from reliable sources can keep the costs of playing radio down enormously. I have had a lot of great used gear pass through my shack. My bad experiences were kept to a minimum because I always made a point of exercising a

great deal of care. I also took full advantage of the wisdom of more experienced hams when I was shopping around.

In the days before Internet sales, there was a built-in level of safety and security to the used ham gear market. In most cases, you were dealing with a member of your immediate ham radio circle, a friend of a friend, or a member of your club. Folk's personal reputations were on the line, so people tended to be fair with one another. Hamfests brought another layer of complexity to the process, but you usually were in a position to know who you were dealing with. (His or her callsign was, more often than not, right on their license plate.)

Today, I try to apply the same principals in Internet dealings. Using basic search tools, it isn't all that difficult to find out a bit more about who you are dealing with, especially if they are a ham. That raises the most important thing I can say about buying used gear. **DO NOT, I TELL YOU THREE TIMES, DO NOT, BUY HAM GEAR FROM NON-HAMS!**

In the past few months, I have had a few friends burned by on-line Estate Sales. A piece of gear would be listed as "new in the original box" or "never used," only to discover that the received rig was well worn and not well taken care of. In my experience, hams don't treat other hams that way. As a matter of fact, if I were to find that changing drastically, beyond the few bad apples any group turns up, I would probably sell my station and take up knitting.

I know it sounds like I am bashing the Internet a bit here, when it really is a useful tool for buying used gear. For example, let's say your little pot of radio money runs around \$200. You can easily search and find what \$200 will buy on the current market. Or let's say you have settled on one particular rig as your heart's desire. Instead of one rig from a member of your club or a couple at a ham fest, you can take advantage of sites that list many of the same rigs for your consideration.

I was very fond of the ARRL's swap site, but that has gone away. Lately I find myself gravitating to eHam's listings at: **www.eham.net/classifieds/** The only point I would make is that they require a subscription to see listings less than 24 hours old. That gives paying customers a leg up on the best deals. An annual subscription to their site is \$15, not an unreasonable amount for the services provided beyond the classified ads.

Another site that has a nice swapmeet setup is QRZ at: **http://forums.qrz.com/forum-display.php?f=7** Also, don't forget our friends



The Heathkit HW101 can still be found on the used market for \$150 and it will work the world in classic style.

at Universal Radio. Fred and his folks always have a nice list of used gear for consideration: www.universal-radio.com/alert.html They offer a 60 day limited warranty unless the item is listed "as is."

❖ Build Instead of Buy

Last month's column covered a good listing of basic kit transmitters, receivers, and transceivers. Kit building, big or small, is a great way to learn your way around radio in general. My favorite HF rigs have all been Heathkits and, in these modern times, Elecrafts. There is nothing like getting on the air with something that came out from under your own soldering iron.

But let's take a step back to that story of the ham with the S-line. His first transmitter was a two tube entirely home brewed unit. The next challenge up from building a kit is to start with a schematic and go from there. Can it be done? Obviously. Will it be easy? That depends. If you are willing to play with QRP power levels, one or two transistors and a handful of common parts will get you on the air.

Do a web search on designs such as W1FB Doug DeMaw's "Tuna Tin II" or GM3OXX George Burt's "Oner," and you will see that you can assemble a fine little transmitter on a piece of breadboard that will get you on the air 100% homebrew for less than \$20 and a few hours at your workbench. Pick up any edition of *The ARRL Handbook for Radio Communication* and you will find proven designs that can be built up for a reasonable cost. In addition to designs for transmitters, receivers and transceivers, you will also find a lot of easily built accessories and test equipment that can help make your current station all the better.

❖ Accessorize Yourself

Speaking of accessories, bought new or used, or built from a kit or schematic, the possibilities for adding bang to your radio shack buck abound. Before we even think about the things that attach to your radios, how about a good look at your operating position? How well does that desk you have work for you? Do you have an adequate number of power outlets to meet your needs? What is your station ground situation? Sometimes the non-radio things can be changed to improve your station performance. Often these are very inexpensive fixes, to boot.

Once you have your shack situation sorted out, it is time to look at the tools to help your radios do their job. If you are a CW person, you have a couple of things to look at. First, adjusting your key or paddles for optimum operation at the speed you normally work is a good start. N1FN Marshall Emm has a great study on how to adjust keys and paddles of all types over at his Morse Express site: www.morsex.com/misc/keyadj.htm. Since Marshall's main business is selling keys, he knows his way around the set-up systems for all the popular designs.

Once you have your paddles straight, you may want to look into your keyer circuit. Things have come a long way in a very short period of time. It wasn't all that long ago we were all excited about self completing dits and dahs. Now we have multiple memory keyers with

auto incrementing number systems. Good keyer designs can be bought as kits or built up from schematics. Either way, you can probably give your CW a boost by looking into this area.

Not a CW Op? (Why not?!) Maybe you can improve your antenna efficiency by adding a tuner system. And no tuner setup would be complete without a good SWR meter.

On the receiving end, adding sharper filtering, either inside or external to your transceiver, will go a long way in clearing out the band clutter.

❖ Not As Off Topic As You May Think

Have you ever thought about this? If you are at home in your shack having a rag chew a couple of states over, you are not out expending income on other pursuits. Have we not always talked about how great the radio hobby is for folks who have a limited ability to get around? Okay, so the limitation in this case might be the thickness of your wallet, but the principal still applies. You can have a heck of a lot of fun close

Outer Limits continued from page 59

- announced)
- Voice of the Abnormal- Another classic pirate radio program has returned to the air. Their shows are certainly abnormal, and they focus around the theme of insanity. The announcer claims that going crazy is appropriate nowadays. (Belfast, but old shows still announce defunct Elkhorn drop)
- Voice of Prozac- As the name implies, drug use is the major theme of their comedy. (thevoiceofprozac@yahoo.com)
- WBNY- Commander Bunny of the Rodent Revolution has been returning to his main format as a clandestine parody, complete with coded messages. (Belfast and rodentrevolutionhq@yahoo.com)
- WEAK- Another veteran pirate has returned. This one has been around for more than 18 years with a rock music format. (None known)
- WMR- "We Monkeys Radio" features only short clips from rock tunes as they broadcast to monkeys, on the theory that monkeys have short attention spans. They appear to be associated with WBNY. (None announced)
- WPON- They are a highly political pirate with frequent machine gun noises and a slogan of "The Weapon." (None)
- Wolverine Radio- This rock music pirate is now a veteran station. (None announced)
- WMPR- Micropower Radio still dominates the "dance music" format on shortwave pirate radio. (Known to QSL mysteriously only at the Kulpville Winter SWL Fest)
- WTCR- Twentieth Century Radio plays music from various decades of the 1900s, from ancient pop to more modern rock. Sometimes they supplement this with SSTV digital broadcasts. (Belfast)
- WTPR- "Tire Pressure Radio" claims that listeners should turn off their radios and not listen to the show. The alleged penalty for violating this advice is four flat tires on your car. (None)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses:

- PO Box 1, Belfast, NY 14711
- PO Box 109, Blue Ridge Summit, PA 17214
- PO Box 146, Stoneham, MA 02180
- PO Box 293, Merlin, Ontario N0P 1W0.
- PO Box 69, Elkhorn, NE 68022 is no longer a valid address.

UNCLE SKIP'S CONTEST CALENDAR

ARRL International DX Contest (SSB)
Mar 7 0000 UTC - Mar 8 2400 UTC

Idaho QSO Party
Mar 14 1900 UTC - Mar 15 1900 UTC

Virginia QSO Party
Mar 14 1800 UTC - Mar 16 0200 UTC

North American Sprint (RTTY)
Mar 15 0000 UTC - 0400 UTC

10 - 10 International Mobile Contest
Mar 21 0001 UTC - 2359 UTC

CQ WW WPX Contest (SSB)
Mar 28 0000 UTC - Mar 29 2359 UTC

QCWA QSO Party
Mar 28 1800 UTC - Mar 29 1800 UTC

to home by way of ham radio.

Have fun. I'll be looking for you on the bottom end of 40 meters.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings is the e-mailed *Free Radio Weekly* newsletter, free to contributors via freeradioweekly@gmail.com. A few pirates will sometimes QSL reports left on the outstanding Free Radio Network web site, at www.frn.net. *The ACE*, a formerly widely read print bulletin, now has a good loggings section and a valuable archive of *Free Radio Weekly* issues at www.theaceonline.com/

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Brian Alexander, Mechanicsburg, PA; Skip Arey, Beverly, NJ; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Ross Comeau, Andover, MA; Wendel Craighead, Prairie View, KS; Richard Cuff, Allentown, PA; Rich D'Angelo, Wyomissing, PA; Gerry Dexter, Lake Geneva, WI; Richard Dillman, Pt. Reyes, CA; Bill Finn, Philadelphia, PA; John Figliozzi, Albany, NY; Harold Frodge, Midland, MI; Captain Ganja, Belfast, NY; William T. Hassig, Mt. Prospect, IL; Harry Helms, Corpus Christi, TX; Ed Ininger, Summit, NJ; Kracker, Belfast, NY (not Washington, DC); Terry Kreuger, Clearwater, FL; Ed Kusalik, Camrose, Alberta; Chris Lobdell, Tewksbury, MA; Greg Majewski, Oakdale, CT; Sverre Martinsen, Rong, Norway; A. J. Michaels, Belfast, NY; Gene Patterson, Gibsonia, PA; Adrian Peterson, Indianapolis, IN; Lee Reynolds, Lempster, NH; Mike Rhode, Columbus, OH; Lee Silvi, Mentor, OH; Arnaldo Slaen, Argentina; John Wilkins, Wheat Ridge, CO; Joe Wood, Greenback, TN; and Dave Zantow, Janesville, WI.

The Many Faces of a Dipole

Our old friend the half-wavelength dipole antenna plays a part in an amazing array of antennas. Let's take a look at some of them.

The Basic Half-Wavelength, Horizontal Dipole

The most common dipole is the horizontal, half-wavelength design (Fig. 1A). The radiation and reception (R&R) patterning of this dipole has broad responsiveness in all compass directions except off the ends of the antenna. In those directions we say that the antenna's horizontal R&R patterning has nulls, because the antenna is less responsive in those directions than in other directions.

When mounted horizontally a half wavelength above earth, the antenna tends to give good low-angle vertical R&R. On HF the lower angle radiation produces more long-distance (DX) communication, with the signals often traveling thousands of miles between stations. On VHF and higher frequencies, the low-angle R&R maximizes communication by concentrating more of the antenna's responding toward the horizon rather than skyward.

On the other hand, when the dipole is mounted a tenth to a quarter of a wavelength above earth, its R&R patterning favors more high, vertical-angle radiation. On HF and MF, the higher angle R&R is called "near vertical-angle skywave," or "NVIS" communication, which favors closer-in communication out to a few hundred miles.

Another DX Antenna

Mounting the half-wavelength dipole vertically (fig. 1B) rather than horizontally produces a non-directional antenna with low vertical-angle R&R. Again, this produces excellent DX performance on HF and lower bands, and out-to-the-horizon communication on VHF and higher frequencies.

A Relatively Non-Directional Antenna

If both ends of a horizontal, half-wavelength dipole antenna are drooped near the earth (fig. 1C), the antenna becomes essentially non-directional. This configuration is known as the "inverted-V."

A Modestly Directional Beam

When one end of a horizontal dipole is lowered near the earth (fig. 1D), the antenna is called a "sloper." Slopers are modestly directional and have some gain in the direction toward which the wire element slopes.

A More Directional Beam

In some Yagi-beam antennas, a dipole slightly longer than a half wavelength is mounted about a tenth wavelength directly behind another half-wavelength dipole. The longer dipole reflects signals toward the other dipole which is connected to the antenna feed line. This two-dipole antenna has directivity and increased gain over a single dipole.

If a third dipole, slightly shorter than a half wavelength, is added in front of the first two

dipoles, this third element becomes a "director element." These three elements make a "Yagi-Uda" beam which has good directivity and gain. By adding more directors, even higher gain and greater directivity can be attained.

Dipoles are also the basic elements in the log-periodic dipole array (LPDA), a very wide bandwidth beam.

And an Even More-Directional Beams

Dipoles are also used as the driven element in beams such as the parabolic-dish reflector beam, the corner-reflector beam, and the trough beam. These beams are generally both more directional and higher in gain than the Yagi-Uda.

MultiBand Dipoles

The basic half-wavelength dipole is cut for one frequency and will perform well over a relatively narrow band of frequencies centered on that design frequency. There are several ways to make dipole antennas function well on multiple frequencies. Actually, the basic dipole will function well, but with more nulls in its R&R pattern, at a frequency near the third harmonic of its original design frequency.

One method of making a multi-band dipole is to add tuned circuits (traps) (fig. 1E) that isolate portions of the antenna's length. The traps cause the antenna to be resonant at both its full-length resonance and at a higher frequency than its full length. Another multi-banding technique is to use multiple dipole elements which are tuned to different frequencies, and then connected together at the feed point (fig. 1F).

A time-honored "all-band" dipole antenna system (fig. 1G) consists of a dipole, usually a half-wavelength long at its lowest operating frequency, which is fed with a low-loss, two conductor line such as open-wire line, ladder line, window line, or twin lead. When used with an antenna tuner at the transmitter end of the feed line, this antenna system can be tuned to operate on many different bands with good efficiency. The R&R patterns for the antenna will be different for each band, with more nulls in the patterns as the frequency is increased.

If Half a Wavelength is Too Long

If your space is limited such that a half-wavelength antenna is impractical, then you might try a shorter one. A dipole can be reduced to as short as a quarter wavelength and still function surprisingly well.

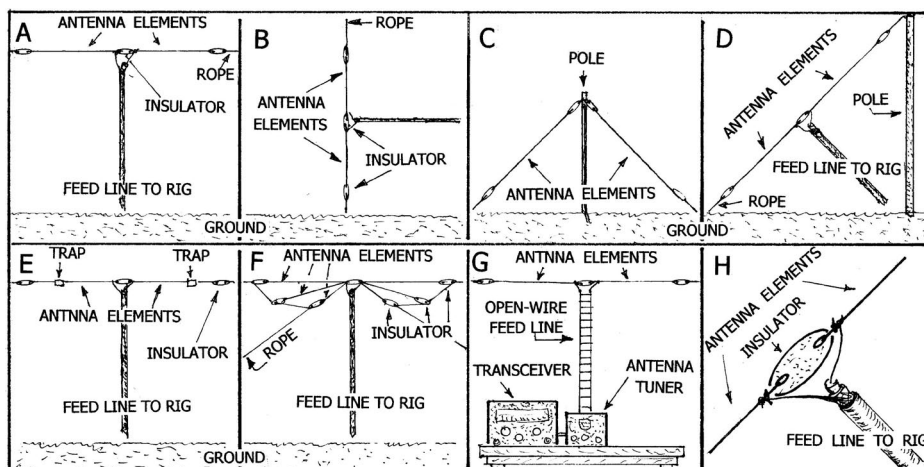


Fig. 1. A HORIZONTAL DIPOLE ANTENNA (A), A VERTICAL DIPOLE ANTENNA (B), AN INVERTED-V ANTENNA (C), A SLOPER BEAM (D), A TRAP DIPOLE (E), A MULTI-ELEMENT DIPOLE (F), AN "ALL-BAND" DIPOLE SYSTEM (G), DETAIL OF SLOPER CENTER INSULATOR (H).

This Month's Interesting Antenna-Related Web site:

A discussion of dipoles, with an interesting animated graphic showing the derivation of a dipole antenna from a capacitor, and the electric and magnetic fields around the antenna:

http://en.wikipedia.org/wiki/Dipole_antenna#Short_dipole

See how high your dipole should be:

www.dxzone.com/cgi-bin/dir/jump2.cgi?ID=12798

❖ Let's Build a Switchable-Direction, Sloper, Beam Dipole

My beam used three slopers (fig. 1D) evenly spaced around one central mast. Each sloper had a separate feed line running to a coaxial switch with one line from the switch to my radio.

1. Cut your sloper elements to length by the following formulas:
Length(in feet) = $468/\text{frequency(MHz)}$, or
Length (in meters) = $143/\text{frequency(MHz)}$
So, for the 20 meter ham band where I used my slopers I calculated: $468/14.25 \text{ MHz} = 32.8 \text{ ft}$. Make the elements something like 1 foot too long to allow for extra wire to attach the insulators. Cut each element at its midpoint to attach the center insulator. As you add the end insulators, make sure that the overall length equals what you got from the above formulas.
2. Attach and solder in place the feed line as shown in fig. 1H. Cover the end of the coax with coax sealant to make it weather proof.
3. Put a short rope on the end insulator of the wire connected to the coax center conductor

RADIO RIDDLES

Last month:

I asked, "The perfectly matched situation (impedances of feed line and antenna feed point the same value) above can be described as a 1:1 level of SWR. How essential to good communication is it to have a 1:1 SWR between your antenna and feed line?"

Well, if feed line loss is low, SWR values even as high as 10:1 may be acceptable in some situations. On the other hand, an SWR this high is unacceptable with solid-state transceivers. This is because, to prevent damage to their components, modern transceivers significantly reduce their power output auto-

matically when SWR value becomes as high as about 2:1. In such cases, using an antenna tuner between the transmitter and the feed line allows adjusting the tuner for a low SWR at the transmitter-feed line connection. Then the higher SWR won't reduce transmitter power.

This Month:

All the dipoles discussed this month are "center fed." This means that they have their feed lines connected at the antenna's center. Can a dipole be fed at other places than its center?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

and tie this to the top of the mast. Make the mast about the length of an element as given by the formula. My mast was wood.

4. Tie a rope to the insulator on the other end of the antenna, and tether the antenna so that it makes about a 60 degree angle with the earth.
5. Run the coax away from the antenna at about 90 degrees, and tie it to the pole (fig. 1D). Run the coax to the building housing your radio.
6. Never use the antenna when lightning is likely: disconnect and ground the antenna when it is not being used.

The Bottom Line

This antenna's performance surprised me. There was some overlap in the signals captured by

the three antennas, but often signals or interference could be essentially selected or rejected just by switching between the antennas.

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The Globe Scout: Making R.F. At Last!

Readers who have been following the column for the past few months are aware of my growing frustration with trying to coax a 1950s era amateur radio transmitter back into operation. Intended for the Novice licensees of the period, the Globe Scout 680 is designed for 65-watt input in c.w. operation. The '680 will also input 50 watts of a.m. phone – a facility that was ready to be used after the Novice upgraded his license to General Class.

❖ The Work So Far

Before trouble-shooting any long-disused piece of equipment, I always replace all paper and electrolytic capacitors. This rig had eight electrolytics (whew!) but (I was happy to see) no paper caps. That done, I plugged in a crystal for the 80-meter band and attempted to tune the rig up. But I wasn't able to obtain either a grid current or plate current reading on the 6146 final amplifier tube.

Voltage readings on both the 6V6 crystal oscillator and the 6146 seemed normal as far as I could tell. (The typical readings given in the manual assumed proper operation of oscillator and final – not much help!). Baffled for the moment, I decided to listen for the crystal oscillator in a nearby communications receiver. And I found it at the expected frequency – though it did sound a bit buzzy and ragged.

With an operating crystal oscillator, but no grid current being observed with the meter switch in the "final grid" position, I reasoned that there might be a problem with the capacitor coupling the oscillator plate to the final grid. Sure enough, it was open, but after I replaced it

I found myself with a different perplexing problem.

Now I had a virtually constant 3/4 scale reading with the meter switch in the "final grid" position! At certain positions of the oscillator tuning capacitor, I could increase the reading – but it would never decrease below the 3/4-scale "floor." This was very strange. When tuning a crystal oscillator, one expects the grid current in the final to be essentially zero, except at a very sharply defined resonance point – where it peaks.

It was equally odd that I was still observing no reading with the meter switch in the "final plate" position. There should have been at least some current flowing in the plate circuit under almost any circuit conditions.

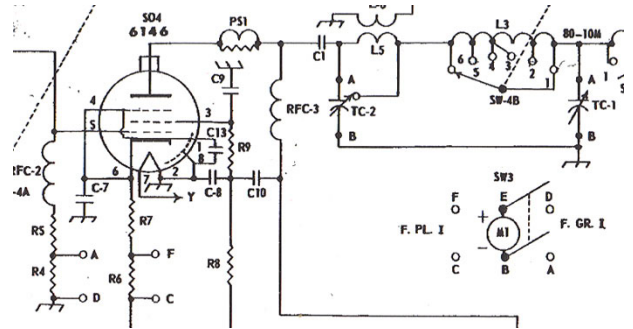
❖ Checking Resistors and Caps

Completely stumped, I now decided to check all of the resistors and capacitors in both the oscillator and final amplifier circuits. Capacitors need to be removed from the circuit to be checked, but one can get a pretty good idea of resistor condition by in-circuit checking. The strategy is based on the facts that resistors can significantly increase in value as they age, but rarely decrease.

If a resistor measures at its proper value – or, if less, at least in the proper ballpark – one can assume for the time being that it is okay. A lower reading probably only means that it is being shunted by other components in the circuit. But if the reading is significantly higher than normal, look for trouble immediately!

My resistor check turned up no trouble. In fact, I was surprised to find that all resistors measured very close to their marked values. The capacitor check would not be quite so easy. The wiring of both the oscillator and amplifier is so dense, with component leads so admirably short, that to disconnect one lead of a capacitor for testing could mean that it would have to be clipped – leaving insufficient slack for reconnection.

So, before proceeding with the testing, I ordered a complete set of all necessary disc ceramic and silver mica capacitors for the oscillator and amplifier stages. That way, I'd be sure to have a replacement for any capacitor I might



This is not the sharpest of schematics – but it does clearly show the 6146 metering circuit. The meter (M1) and SPST switch (SW3) are at lower right. The lettered terminals are connected to the corresponding points on the 6146's grid and cathode "current sensing" resistors (R4 and R6) at lower left.

have to destroy.

And this looks like a good place to put in a plug for my favorite parts source: Radio Daze of Mendon, NY. The nice folks at Radio Daze understand the needs of radio hobbyists, cheerfully and promptly filling our small orders – including my \$12.00 selection of capacitors.

Their minimum is a low \$10.00, excluding shipping charges – which typically are simply the USPS Priority Mailing costs. There are no handling charges. Visit the Radio Daze web site at www.radiodaze.com to browse their extensive on-line catalogue and/or request a free printed catalogue. Ordering is easy via the toll-free telephone line at 877-653-8823.

When the new capacitors arrived, I disconnected the originals one by one and evaluated them on my capacitor checker. They all looked good except for the screen bypass for the 6146 final – an .005 uf, 600-volt disc ceramic. I was delighted to find that it was very leaky and hoped it would be the key to solving my problem.

I went ahead and replaced all six disc ceramics in the set. They were all of the same manufacture, and I figured that if one had gone bad others might well follow. I also replaced a .0047, 1000-volt bypass, one of whose leads broke off as I moved it slightly to get at a component underneath. I was certainly happy that I had decided to order a complete set of replacement caps!

With high hopes and crossed fingers, I powered up the Globe Scout once more and placed it in "CW transmit" mode. But my hopes were quickly dashed. Once again I was looking at that permanent high reading with the meter switch in "final grid" position and that permanent zero reading with the switch set to "final plate."



Under the 6146 tube socket, showing four of the replaced .005 uf capacitors. The larger one is a 1600-volt unit, replacing the original 1000-volt capacitor.

❖ A Breakthrough at Last!

I've never been one to hold back on discussing setbacks in the restorations I do for this column. As far as I'm concerned, they're part of the story and can only add to the credibility of the projects. It doesn't happen very often, but on at least two occasions I've completely dropped restorations that I felt I could take no further.

Quite honestly, I was close to doing that with the Globe Scout project when I had a strange breakthrough! As mentioned, I'd been really bothered by what seemed to be a total lack of final plate current. That led me to wonder if there could possibly something wrong with the meter switching circuit – perhaps a disconnected wire. There was something wrong all right – but it went way beyond a mere open circuit!

As in most small transmitters of the era, final grid and plate current are measured by a sensitive voltmeter connected across properly calibrated resistors connected so that the current to be measured flows through them. As the current varies, so does the voltage drop across the resistors.

In the Globe Scout, a single-pole-double-throw toggle switch is used to transfer a dual-scale meter between the grid current and plate current resistors. Wondering if the plate current circuit might be open somewhere, I began to trace the leads from the switch to the resistors.

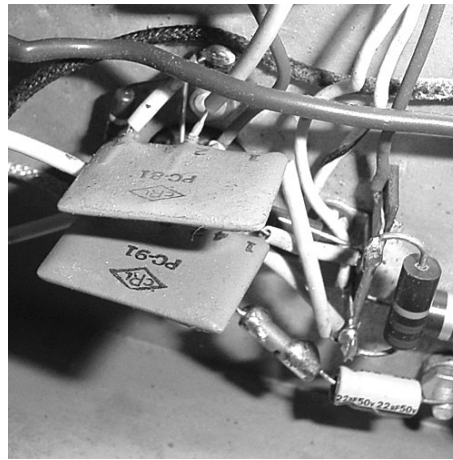
I almost couldn't believe my eyes when I discovered that the meter was connected to the *grid current* resistor when the switch was placed in the "final plate" position and to the *plate current* resistor when the switch was placed in the "final grid" position. I'd been doing the tune up backwards!

Now the really strange thing about this is that my set was not a kit version, but had definitely been factory wired. I had downloaded the complete kit manual, however, so I could check the wiring against the pictorial and schematic diagrams. The wiring was absolutely correct – each lead was connected to the physical terminal specified in the pictorial!

Perhaps the set had once used a switch of a different design. But with the model used in my set, throwing the switch to the grid position connected the meter to the plate resistor and vice versa. Furthermore, there was absolutely no sign that this toggle switch had been turned to a different position after installation. In fact that would have been well nigh impossible considering the crowded chassis layout.

The wiring also looked as if its original factory configuration had never been disturbed – except that one ground lead had been removed and resoldered. In fact, much as I would now like to reverse the wiring, that, too, looks almost impossible because of inaccessibility.

It seems as if the problem could easily have been caused by substitution, during production, of a switch with a different design. But this rig *must* have been tested before it left the factory. Why the error was not detected and



The two "Couplates," not much larger than postage stamps, contain a total of 11 discrete components.

corrected at that time is a real head-scratcher.

And how did the tune-up now go using my new knowledge? Very well indeed. I inserted an 80-meter crystal into the crystal socket and connected the antenna to a dummy load through an r.f. power meter. Placing the meter switch in the "plate" position to tune up the grid, I immediately found the expected sharp peak as the oscillator tuning capacitor passed through resonance. I had seen no reading in this switch position when I thought I was measuring plate current, because the oscillator tuning control didn't happen to be near the spot where grid current peaked. (Read these last sentences slowly a couple of times and they *will* make sense!)

Next I moved the meter switch to the "grid" position to measure plate current. And now that I knew I was measuring plate current, the approximately 3/4 scale reading on the meter made complete sense. Adjusting the "Final Plate Tune" control, I was able to obtain the expected plate current dip. Then I advanced the "Antenna Load" control to the specified 130 mA plate current reading.

After readjusting the oscillator tuning, plate tuning and antenna load controls as specified, I looked at the reading of the r.f. wattmeter inserted between rig and dummy load. The rig was now putting out over 50 watts of r.f. in c.w. mode on 80 meters – which was probably about right for the its 65-watt c.w. input rating. At the moment I'll take proper operation on the other amateur bands for granted, because I'd need crystals (or a vfo) in the 40-meter range to check them out.

❖ Not Out of the Woods Yet

It looks like establishing proper a.m. operation is going to present another problem. In theory, one connects a mic, tunes up in c.w. mode, moves the front-panel switch from c.w. to phone, advances the mic gain control and begins talking. I did all this, but could not hear any modulation on the carrier when I tuned it in on a nearby communications receiver.

One problem might be that the output level of my Astatic D-104 crystal mic has perhaps

fallen off with age. I haven't used it in about 10 years – though I have been careful to store it in a warm dry place to avoid absorption of moisture by the Rochelle Salts crystal element.

I'm still not sure about the mic. I've connected it to the audio amplifier of my Eico signal tracer and established feedback through the signal tracer's speaker, but it is difficult to tell much about voice quality in this type of a test. I've also used the signal tracer to follow the mic audio through the Globe Scout's 6U8 2-stage amplifier tube and the 6L6 modulator.

The signal is definitely making it through all the way, though I haven't tried, yet, to measure actual gain. To do that I'll have to get out my audio generator. I'll also have to figure a better way of testing the D-104 or perhaps find another high-impedance crystal mic known to be good.

I am also concerned about the "Couplates" (mentioned in one of the earlier articles in this series) used to couple the audio stages. These primitive ancestors of our modern integrated circuits contain resistor and capacitor networks sealed within a wafer-like housing not much bigger than a large postage stamp.

Between them, the two Couplates contain six capacitors and five resistors. Replacing them with discrete components will be quite a trick in the Globe Scout's crowded audio section! One hopeful note is that the tube voltages look reasonably close to normal.

With luck, perhaps we can restore the Globe Scout's AM function and wrap up this project by the next issue!

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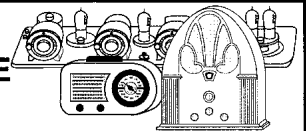
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Basic Antennas: Understanding Practical Antennas and Design

By Joel R. Hallas, W1ZR

Notes on the back of this book promise: "A comprehensive introduction to antennas – basic concepts, practical designs, and details of easy to build antennas." Happily, author Joel R. Hallas, W1ZR, delivers on that promise.

If you're willing to give this book some serious time and thought, you will be rewarded with an excellent introduction to what makes antennas tick and a useful survey of many practical antenna designs. The designs covered are for antennas common to applications from high-frequency on into the microwave region of the radio-frequency spectrum. And you'll even find directions for building some of those designs yourself.

The book begins with an introduction to radio-frequency current and explains that this current flowing in a conductor leads to the radiation of radio waves. Discussions of factors such as antenna radiation patterns, antenna feed-point impedance, and the effect of the earth beneath the antenna on these factors prepares the reader to understand the discussions of the performance of the various antenna designs which follow.

After introducing the basic half-wave-length dipole antenna, the author builds on this introduction to present various designs utilizing dipole elements in other antennas. As the book progresses, a wide variety of antenna designs are presented, along with discussions of their operating characteristics.

By the book's end, the reader is acquainted with various vertical and horizontal antenna designs, linear-element beams, surface-reflector beams, parasitic-reflector beams, long-wire antennas, large and small loop antennas, log-periodic designs, slot antennas, patch antennas, and multiband and wideband antennas, as well as a number of other antenna designs. In addition, the basics of such related topics as

transmission lines, wave guides, antenna measurements, and computer modeling of antennas are introduced.

The information in this book is presented as a natural progression of ideas in which new facts build upon those previously presented. As an example, the section on loop antennas begins by developing the idea of a large square loop and discussing its characteristics. Then loops of other shapes are covered and their radiation patterns discussed. Following this, small loops are introduced, and their functioning contrasted to that of large loops.

Moving on to the practical side of loop antennas, the next chapter gives instructions for building and operating large loops such as quad loops and cubical-quad beams, as well as small table-top loops. This logical development of ideas is an obvious benefit to understanding the technical ideas covered in a text on antennas.

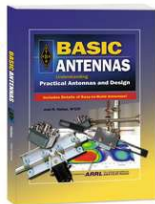
Basic Antennas, like most technical books, presents concepts that may require some thought and reflection by the reader. It is not an engineering text, but it *is* a technical book, and skimming through it will miss much of the value the book has to offer. On the other hand, after reading and digesting its contents, you will have a good grasp of the basic factors in antenna performance.

You will also be familiar with a broad sampling of useful antenna designs. And you will have something else that most radio enthusiasts want: you will know how to consider the factors you've learned from this text when choosing, and (for some of the designs) even building antennas for your communication needs.

This will be a book you will keep on your shelf and reach for frequently as you continue your adventures in the fascinating field of radio-communication antennas.

The *Basic Antennas* book is available from the ARRL Bookstore at www.ARRL.org or call 888-277-5289. This first edition is © 2008, The American Radio Relay League, Inc. (ISBN: 0-87259-999-X) #9994 -- \$29.95.

Reviewed by MT columnist
W. Clem Small, KR6A.



(2.8 GHz), to intercept analog signals of these devices and even display their picture in full color on its 2.5" LCD screen. A 3.5 mm video output jack accommodates an external monitor.

The receiver automatically sweeps its programmable frequency bands looking for signals, displaying detected signals as spikes on a spectrum analyzer screen. Set in the manual mode, the user may step through the frequency range in any preset interval between 2 and 10 MHz in 1 MHz increments. Ten search banks allow user-selectable search ranges, and 10 memory channels allow storage of discrete frequencies.

Detectable formats include NTSC, PAL, CCIR, EIA, and scrambled/reverse polarity video signals often encountered on 1.2 GHz L band and 2.4 GHz S band (WiFi). Typical sensitivity is -80 dBm @ 2.4 GHz.

The operator may select the video quality threshold level for display, as well as the acceptable level of noise interference.

Images may be time stamped and recorded at the press of a button, and up to nearly 2000 images can be stored on an optional, plug-in SD memory card. A USB port allows transfer into a computer for image storage.

The receiver measures 2.6"W x 5.2"H x 1.3"D and weighs 15 oz. It is powered either externally by 6VDC, or internally by four AA alkaline or rechargeable NiMH cells (provided).

❖ Our Test

Don't expect subversive video surveillance cameras at every turn; they are few and far between. Our search through a small town revealed none in use at Wal-Mart, Lowe's, banks, stores, or anywhere else in the commercial divisions. Such installations generally have AC power, and their surveillance cameras are commonly connected through coax cable.

But for law enforcement applications to test known wireless cameras, or to search for suspect cameras in remote areas where a cabled video installation is unlikely, but where wireless cameras might possibly be placed, this is the debugging instrument to take along!

The AR-STV comes with instruction manual, rubber flex antenna with SMA base, belt clip, and rechargeable NiMH cells. It sells for \$869.95 at Grove Enterprises (800-438-8155 or www.grove-ent.com) and other AOR dealers.

Review by MT Publisher Bob Grove

MT READERS ONLY



To access the restricted web-site for the month of March, go to www.monitoring-times.com, click on the key, and when prompted, enter "mtreader" under the user name. Your password for March is "harrier" – Check in each month for new material!

AOR AR-STV Wireless Camera Detector

With growing concerns for both safety and security, video cameras are being placed in large numbers throughout the country. But are all these cameras in your best interest? Are some cameras meant to compromise your own privacy? You can perform your own surveillance for these intrusive devices with an affordable new product.

AOR has just released a hand-held wireless camera detector, basically a TV receiver with continuous tuning from 900-2800 MHz

Big Savings on Radio Scanners

Uniden® SCANNERS



Bearcat® 796DGV Trunk Tracker IV with free scanner headset

Manufacturers suggested list price \$799.95

CEI Special Price \$519.95

1,000 Channels • 10 banks • CTCSS/DCS • S Meter
Size: 6"15/16" Wide x 6"9/16" Deep x 2"3/8" High

Frequency Coverage: 25.0000-512.0000 MHz., 806.0000-956.0000 MHz. (excluding the cellular & UHF TV band), 1,240.0000-1,300.0000 MHz.

When you buy your Bearcat 796DGV TrunkTracker package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC796DGV scanner purchase, you also get a **free deluxe scanner headphone** designed for home or race track use. Headset features independent volume controls and 3.5 mm gold right angle plug. The 1,000 channel Bearcat 796DGV is packed with features to track Motorola Type I/II/III Hybrid, EDACS, LTR Analog Trunk Systems and Motorola APCO 25 Phase I digital scanner including 9,600 Baud C4FM and CQPSK. Also features control channel only mode to allow you to automatically trunk many systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control and programming with RS232C 9 pin port (cable not supplied), Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for \$29.95. For complete details, download the owners manual from the www.usascan.com web site. For fastest delivery, order on-line at www.usascan.com.

Bearcat® BCT8 Trunk Tracker III

Manufacturer suggested list price \$299.95

CEI Special Price \$169.95

250 Channels • 5 banks • PC Programmable

Size: 7.06" Wide x 6.10" Deep x 2.44" High

Frequency Coverage: 25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 400.0000-512.0000 MHz., 806.0000-823.9875 MHz., 849.0125-868.9875 MHz., 894.0125-956.0000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker ESP20 with mounting bracket & 10 feet of cable with plug attached \$19.95. Magnetic Mount mobile antenna ANTMMBNC for \$29.95.



Bearcat® BCD396T Trunk Tracker IV

Suggested list price \$799.95/CEI price \$519.95

APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging.
Size: 2.40" Wide x 1.22" Deep x 5.35" High

Frequency Coverage:

25.0000-512.0000 MHz., 764.0000-775.9875 MHz., 794.0000-823.9875 MHz., 849.0125-868.9765 MHz., 894.0125-956.0000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning. **Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is

organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3AA NiMH or Alkaline battery operation and Charger** - 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAh Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. **Unique Data Skip** - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. **Memory Backup** - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. **Manual Channel Access** - Go directly to any channel. **LCD Back Light** - A blue LCD light remains on when the back light key is pressed. **Autolight** - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. **Battery Save** - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. **Attenuator** - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.

More Radio Products

Save even more on radio scanners when purchased directly from CEI. Price includes delivery in the continental USA excluding Alaska.

Bearcat 898T 500 channel TrunkTracker III base/mobile.....	\$209.95
Bearcat 796DGV 1,000 channel TrunkTracker III base/mobile.....	\$519.95
Bearcat BCD396T APCO 25 Digital scanner with Fire Tone Out.....	\$519.95
Bearcat 246T up to 2,500 ch. TrunkTracker III handheld scanner.....	\$214.95
Bearcat Sportcast 230 alpha display handheld sports scanner.....	\$184.95
Bearcat 278CLT 100 channel AM/FM/SAME WX alert scanner.....	\$129.95
Bearcat 248CLT 50 channel base AM/FM/weather alert scanner.....	\$104.95
Bearcat 92XLT 200 channel handheld scanner.....	\$109.95
Bearcat 72XLT 100 channel handheld scanner.....	\$99.95
Bearcat BR330T up to 2,500 ch. TrunkTracker III with Tone out.....	\$274.95
Bearcat BCT8 250 channel information mobile scanner.....	\$169.95
Bearcat 350C 50 channel desktop/mobile scanner.....	\$104.95
AOR AR16BQ Wide Band scanner with quick charger.....	\$199.95
AOR AR3000AB Wide Band base/mobile receiver.....	\$1,079.95
AOR AR5000A+3B Wide Band 10 KHz to 3 GHz receiver.....	\$2,599.95
AOR AR8200 Mark IIIB Wide Band handheld scanner.....	\$594.95
AOR AR8600 Mark II Wide Band receiver.....	\$899.95
AOR AR-ONE Government/Export sales only 10 KHz-3 GHz.....	\$4,489.95
Scantcat Gold For Windows Software.....	\$99.95
Scantcat Gold for Windows Surveillance Edition.....	\$159.95

Bearcat® BC246T Trunk Tracker III

Suggested list price \$399.95/CEI price \$214.95

Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging.
Size: 2.72" Wide x 1.26" Deep x 4.6" High

Frequency Coverage:

25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 216.0000-224.9800 MHz., 400.0000-512.0000 MHz., 806.0000-823.9875 MHz., 849.0125-868.9875 MHz., 894.0125-956.0000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAh nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part #HF24RS for \$29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.



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 For over 36 years, millions of communications specialists and enthusiasts worldwide have trusted Communications Electronics for their mission critical communications needs. It's easy to order. For fastest delivery, order on-line at www.usascan.com. Mail orders to: Communications Electronics Inc., P.O. Box 1045, Ann Arbor, Michigan 48106 USA. Price includes \$30.00 UPS Ground shipping/handling/insurance per scanner to a street address in the continental USA excluding Alaska. Add \$20.00 shipping for all accessories. For shipments to Canada, Puerto Rico, Hawaii, Alaska, Guam, P.O. Box, APO/FPO, USPS Priority Mail or UPS 2 business day delivery, add \$30.00. Michigan residents add sales tax. No COD's. For Bearcat scanners your satisfaction is guaranteed or return item in unused condition in original packaging within 61 days for refund, less shipping charges. 10% surcharge for net 10 billing to qualified accounts. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. We welcome your Discover, Visa, American Express, MasterCard, IMPAC or Eurocard. Order toll free, call 1-800-USA-SCAN or 1-734-996-8888 if outside Canada or the USA. FAX anytime, dial 1-734-663-8888. Dealer and international inquiries invited. Order your radio scanners from Communications Electronics today.

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For over 36 years, millions of communications specialists and enthusiasts worldwide have trusted Communications Electronics for their mission critical communications needs. It's easy to order. For fastest delivery, order on-line at www.usascan.com. Mail orders to: Communications Electronics Inc., P.O. Box 1045, Ann Arbor, Michigan 48106 USA. Price includes \$30.00 UPS Ground shipping/handling/insurance per scanner to a street address in the continental USA excluding Alaska. Add \$20.00 shipping for all accessories. For shipments to Canada, Puerto Rico, Hawaii, Alaska, Guam, P.O. Box, APO/FPO, USPS Priority Mail or UPS 2 business day delivery, add \$30.00. Michigan residents add sales tax. No COD's. For Bearcat scanners your satisfaction is guaranteed or return item in unused condition in original packaging within 61 days for refund, less shipping charges. 10% surcharge for net 10 billing to qualified accounts. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. We welcome your Discover, Visa, American Express, MasterCard, IMPAC or Eurocard. Order toll free, call 1-800-USA-SCAN or 1-734-996-8888 if outside Canada or the USA. FAX anytime, dial 1-734-663-8888. Dealer and international inquiries invited. Order your radio scanners from Communications Electronics today.

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A Simple Zener Diode Meter

By Carl Herbert AA2JZ

Reading the identifying part numbers on Zener diodes is often difficult. Then to find that the part number isn't listed in your conversion manual is exasperating. This circuit should help.

This project was inspired by the above comments. While on the computer, I found a "Zener Diode Tester," schematic¹. All was well until I realized that the design elements were not all available in the United States. The recommended transformer, an LT-700², is readily available in England, but not here.

The NE555 is wired as an astable oscillator. Values of components were selected to provide adequate timing to produce voltage necessary to test the diodes. Output from the NE555 is coupled through a capacitor to the primary side of an audio output transformer.

The secondary side of the transformer, having fewer turns of wire and therefore lower impedance, will act as a "step-up" transformer. The alternating current is then rectified with a power diode (1N4004), the ripple is smoothed by a 4.7ufd 150 volt capacitor and applied to the diode under test.

Output from the circuit to the diode will be in the 80 to 90 volt D.C. range if wired correctly. A digital multimeter, set to read "volts D.C.," is attached across the diode under test, and will read the "operating voltage" of the diode.

❖ Swap-outs and Adjustments

The transformer from the original schematic has a primary impedance of 1K and a secondary impedance of 8 ohms. I substituted a Radio Shack® Audio Output Transformer, p/n 273-1380 which has the same rating. Once the circuit was completed as shown in the original schematic, the voltage reading for a known diode were all "low."

It was time for some "re-engineering" to see if I could have a working circuit with parts readily available to me. The original schematic shows two dropping resistors and a selector switch, in line with the diode under test. These were eliminated, along with the associated selector switch. (Hence the additional hole in the front cover, now qualifying as "ventilation.")

The voltage reading increased, but not enough.

Some trial and error methods were used to find that using a 1000ufd capacitor from pin 3 to the output transformer, and replacing the value of the resistor at pin 2 from 82k to 75k, brought the readings of the diode under test to an acceptable level. Readings are slightly low, but usable for sorting diodes, etc.

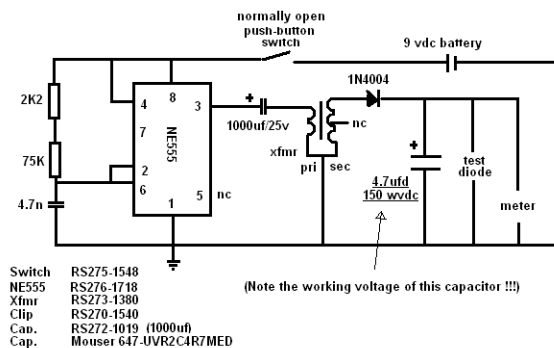
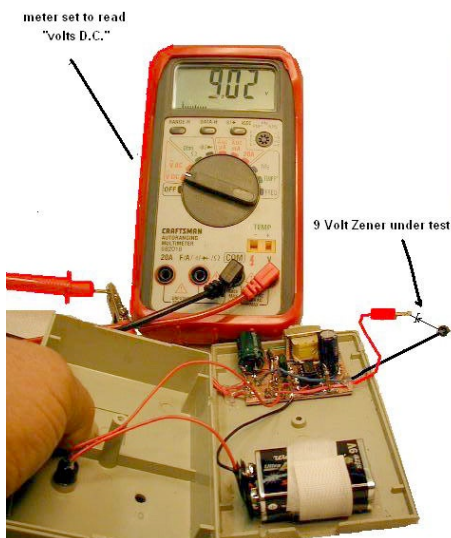
Zener diodes tested using this device are as follows:

spec	device	actual
10v	5019a	9.8 vdc
9.1v	1n757a	9.0 vdc
5.6v	1n4734	5.5 vdc

❖ Construction and Operation

When the normally open switch is depressed, voltage is applied to the diode under test. If the diode is "good," the diode will reach its operating voltage and remain at that voltage, which will be indicated on the multimeter. Removing the diode under test and operating the switch, the reading on the meter will show a continuing increase of voltage available from the circuit.

The circuit board was constructed "Manhattan Style," by super gluing small circuit board stock pads on a larger base of the same material.



The base measures 1-1/2 by 2 inches. It may be small for some builders. Use your own judgment.

The case used is a recycled garage door opener housing I had. It measures 1 by 3 by 5 inches. You'll likely find something "prettier," either at a hamfest, or at Radio Shack®. Parts from Radio Shack are listed on the schematic, as is one from Mouser³. I used "junk box" stock; my over voltage capacitor was removed from an ancient television receiver.

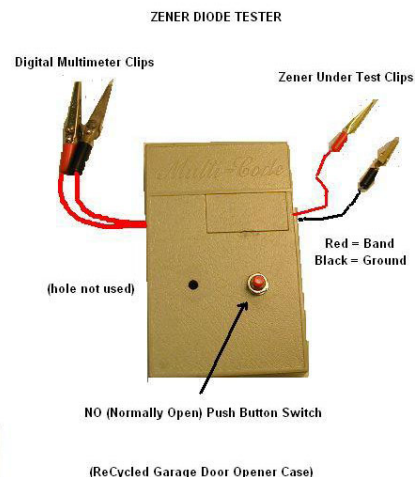
The board is "hot glued" to the case, and small dabs of hot glue are used to hold the meter leads and the diode test leads to the case. This was done to avoid accidentally pulling the leads from the circuit board.

This project enables me to sort Zener diodes effectively, without having to resort to the magnifying glass to see those tiny numbers!

¹ www.csgnetwork.com/zenerdiode555.tester.html

² www.stortech.co.uk

³ www.mouser.com; 800-346-6873



California continued from page 21

worker at the naming ceremony said that Ralston was "Muy modesto" (very modest). Thus, the town was named Modesto.

Jump to the 20th century, Modesto was the film site of the story of coming of age in 1962 – *American Graffiti*,, cruising main street and listening to Wolfman Jack on the radio.

Police

453.175	UHF Interoperability
460.025	Tactical
460.175	Detectives
460.375	Dispatch
460.4875	Tactical
460.500	Secondary & talk around
857.4625	Encrypted (P25)

Fire

155.295	EMS Dispatch
155.940	Fire Command

Misc.

153.350	Tri-Valley Growers
463.9125	Schools operations

Harry Sham Field – Modesto (MOD)

Approach	120.95
ATIS	127.7
CTAF 125.3	
Departure	120.95 123.85 125.1
Ground	121.7
Tower	125.3 257.8
Unicom	122.95
Weather ASOS	(209) 572-0914
Sky Trek Aviation	132.0

SAN JOAQUIN COUNTY

Sheriff

453.325	Jail
453.375	Juvenile Detention
460.100	Court Services
460.125	Dispatch
460.225	North County tactical
460.350	Records
460.475	South County Tactical

Fire

152.3525	South Command
153.920	Stockton VHF link
154.010	Lodi Dispatch
154.070	County Fireground
154.130	North Dispatch
154.235	County Fireground
154.265	Mutual Aid
154.280	Mutual Aid
154.295	Mutual Aid
154.310	North Fireground
154.725	South Command fireground
155.895	South Dispatch
158.940	Lodi Fireground

Misc.

453.375	Public Works East (also animal control)
453.650	Public works West (also animal control)
463.125	Lodi Memorial hospital
938.425	San Joaquin County "Dial-A-Ride"
938.4375	San Joaquin County Bus Dispatch

City of Lodi

Yes, this is the same place made famous in the Credence Clearwater Revival song of being "stuck in Lodi again."

453.350	PD Secondary
460.300	PD Dispatch

City of Stockton

Police

460.075	PD Ch 4
460.200	PD Ch 2
460.250	PD Ch 3
460.325	Records

460.400	PD Dispatch
460.425	PD Ch 6
Fire	
460.550	FD Ch 6
460.575	FD Control 2 Tactical
460.600	FD Tactical
460.625	FD Dispatch Control 1

Port of Stockton

The Port of Stockton is a deep water port on the San Joaquin River prior to its connection with the Sacramento River. It flows to Suisun Bay and on into the San Francisco Bay area.

153.785	Port Operations
154.070	Sharpe Army Depot
154.830	Port Police Dispatch
156.800	Distress and calling
Misc.	
453.450	Stockton Unified School District PD Dispatch
453.950	Stockton Unified School District PD Tactical
461.275	Sherwood Mall Security
463.2625	Macy's Security (Sherwood Mall)
463.6375	Macy's Security (Sherwood Mall)
464.575	San Joaquin General Hospital Security
464.675	School busses

University of the Pacific

464.5875	Campus PD
464.975	Campus PD Dispatch

Stockton airport (STK)

ANG Ops	139.4 356.9
Approach	123.85 124.8 125.1
ATIS	118.25 (209-982-4667)
CTAF	120.3
Departure	118.25 125.1
Ground	121.9
Tower	120.3 239.0
Unicom	122.95
Weather ASOS	(209) 982-4270

And don't forget ...

Wherever you travel, whether here in the lush and scenic Central Valley or anywhere else in the country, you should keep the Family Radio Service (FRS) and General Mobile Radio Service (GMRS) frequencies loaded permanently into your scanner. You never know what you might hear.

Want to get in on the action? FRS radios are inexpensive, loaded with features, and require no license. GMRS radios also have a lot of features, run much higher power and require a valid FCC license.

FRS

Ch 1 – 462.5625	Ch 2 – 462.5875
Ch 3 – 462.6125	Ch 4 – 462.6375
Ch 5 – 462.6625	Ch 6 – 462.6875
Ch 7 – 462.7125	Ch 8 – 467.5625
Ch 9 – 467.5875	Ch 10 – 467.6125
Ch 11 – 467.6375	Ch 12 – 467.6625
Ch 13 – 467.6875	Ch 14 – 467.7125

A	B	C
462.550	467.550	462.5625
462.575	467.575	462.5875
462.600	467.600	462.6125
462.625	467.625	462.6375
462.650	467.650	462.6625
462.675	467.675	462.6875
462.700	467.700	462.7125
462.725	467.725	

A: Base, mobile relay, fixed station
B: Mobile, control, fixed in duplex mode
C: Interstitial, base and mobile simplex

For you country music fans that are familiar with the *Sons of the Pioneers*, I suggest you pick up and listen to any of the many CDs put out by the Valley's own *Sons of the San Joaquin*. They sing true western music which harkens back to valley life when the world was far simpler.

Due to the many frequencies and locations, I have not listed the trunking systems of AT&T, Pacific Gas & Electric (PG&E), Southern CA Edison, and The California Department of Transportation (CalTrans). Other than the prisons, state and federal, and the previously listed counties, there is not a lot of trunking in the Valley.

There you have it: a comprehensive look at monitoring the California "Central Valley." The Valley has it all for a most interesting vacation ranging from radio monitoring, national parks, many tourism venues, fruit and winery trails, hiking, and much more. I hope to see you come out to this very important but little known area which contributes so much to the country and the state's economy.

Happy Monitoring!

About the Author:

Prior to retirement, Bruce Ames was a very frequent business traveler throughout the West for almost thirty years. He is a former feature and column writer for RCMA, Scanning USA, and was Vice President and newsmagazine editor for (San Francisco) Bay Area Scanner Enthusiasts (BASE). He currently is a moderator on the Internet user group, Scan Fresno. He is a licensed amateur radio operator KE6HPK and GMRS as KAE9222.

Sources used for this article include: personal monitoring and logs, RadioReference, AirNav, Flight Guide, Wikipedia, Valley Yahoo scan groups, local County Visitor Bureaus, along with other esoteric sources.

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NASB is a member of the HFCC (High Frequency Coordination Conference) and the DRM (Digital Radio Mondiale) Consortium

An "Atom" Powered PC for Radio Enthusiasts

In the early days of the US space program, scientists realized they had a show-stopping problem. If all went as planned, manned and un-manned space probes would require electrical power for prolonged periods of time. This amount of energy was much more than batteries could provide. However, size, environment and weight limitation precluded normal electricity generators as an option.

Their revolutionary answer, which allowed the space program to go ahead, was found in the use of the atom. They created a relatively small, lightweight atomic reactor whose heat was used to produce electricity. (In fact, I think a few are still sitting on the surface of the moon.)

This month we are going to take a look at a small, lightweight, mini-desktop PC, aimed squarely at radio monitors and hams. We will be looking at the "Radio Friendly PC" from Hudsonville Computers, <http://hcscs.webs.com/>.

Now, what do you think is the name of the new Intel CPU that is the heart of this mini-mite? It's called the Atom. See, it really is "Atomically" powered! And you doubted me...

❖ What's An Atom?

One reason Intel brought the Atom to life was to compete with small area microprocessors, such as the ARM. The area of a chip is directly related to its cost. Smaller is cheaper. But smaller area also means less individual devices on the chip. And this usually means less computing power.

So what happened? First, advances in semiconductor processing technology have allowed the size of individual devices to shrink. Thus, more transistors can now be made in a given area. Secondly, Intel carefully targeted the low to medium power computing sector. One such application is the recently introduced "nettop" or "netbook" computers. These easy to carry, mini-sized laptops have 8-inch screens and their primary use is for accessing the Internet. For those of us who are old enough to remember, just think of these nettops as terminals on steroids.

Our commonly used standalone PCs require that most, if not all, storage and processing takes place locally in the PC. The nettop is designed to have a small amount of local memory, usually in the form of solid-state memory. To minimize the size and power consumption, hard drives are out. In theory, most of the computing power and required storage can be done remotely on websites. Therefore, nettop hardware need not be as powerful as a standalone PC.

The nettop/netbook is a perfect applica-



Figure 1 – The Radio Friendly PC powered by the Atom – A Mini Desktop PC with lots of port choices!

tion for Intel's Atom processor, but has Intel produced a small, low power processor that can do much more than it was originally designed to do? Good question.

❖ Comparing Atoms to Pentiums

Let's begin by comparing the benchmark performance rating of the Atom to a Pentium with a similar rating. The Atom has a number of members in its product family. The Radio Friendly PC uses the Atom 230 which was introduced in mid 2008. It has one processor core running at 1.6 GHz, 512K of cache memory, and a 533 MHz front side bus. It supports Hyper-Threading technology and 64 architecture.

Not too long ago these specs would have put this processor firmly in the "powerful" category, but not today. PassMark, a CPU benchmarking program, www.cpubenchmark.net/, puts the Atom 230's performance at a score of 245. This is better than a Pentium 4 1.8 GHz processor, which scored 243. But the Atom 230's performance falls just below the Pentium 4 1.9 GHz.

However, benchmarking does not always tell the full story and should be used as a general indicator. The type of application, graphic intense or computational intense, really defines a processor's usefulness.

Although benchmarking performance is similar between the Atom 230 and the P4 1.8 GHz, there is a huge difference in the amount of electrical power that each uses. The Pentium 4 1.8GHz chip alone burns over 60 watts of power. While the Atom 230 does the job using under 5 watts! The total power consumption of the Radio Friendly PC, running programs is around 45 watts, less than the power just consumed by the Pentium 4 chip by itself. This is the result of real semiconductor progress over the past few years.

Not only does this mean less drain on a power supply, but it also allows for a significantly smaller cooling requirement. And this in turn results in a smaller, more compact printed circuit board. And finally, these facts allow the Radio Friendly PC desktop to have a diminutive size of 8.7"(w) x 5.1"(h) x 13"(d) and still have comfortable fit. See Figure 1. My first Compaq laptop (luggage-top) was larger.

Now, this is not the first mini-desktop I've used. However, the Radio Friendly PC runs the coolest, is the most quiet and, with a price of under \$400 plus shipping, is by far the least expensive I've used!

❖ What's Inside?

Inside the nicely styled case is a 160G SATA hard drive, 2 Gig DDR2 RAM, DVD/CD writable drive, six USB ports, 9-pin serial port, parallel port, Realtek ALC662 audio sound ports, a video port using the Intel Graphics Media Accelerator 950, ps2 keyboard/mouse ports, and a 10/100 Mb/s LAN connection. One expansion port slot is available. The Atom 230 1.60 GHz processor, with a bus speed of 533 MHz, runs everything.

Notice that the Radio Friendly PC (RFPC) has a 9-pin serial port in addition to USB ports. This is an uncommon combination these days, especially on small PCs and laptops. But, as we will see, this is very useful and convenient when running radio applications.

To save shipping costs, RFPC does *not* come with a monitor, mouse, or keyboard. But most of us have a few peripherals hanging around our basements from PCs long gone.

❖ Software Included

For \$400 the Radio Friendly PC comes with a fully registered version of Windows XP Home and DVD/CD burning software. A CD containing all the drivers and support utilities for the motherboard is also included. Microsoft has threatened to pull XP out of production sometime in 2009.

Hudsonville Computers has informed me that when that happens they will supply Vista Home Basic. However, they are also looking at Windows 7 very carefully. Stay tuned. Windows 7, the announced replacement for Vista, will be the topic of an upcoming article in this column.

❖ What's Outside?

The front of the Radio Friendly PC's case has a polished metal finish with three pop-open

doors. Behind one door is the DVD/CD writable drive. A second similar door is for a future expansion drive. The third smaller front door, seen at the left side of Figure 1, conceals two USB ports and audio connections. This makes connecting radio audio cables and USB radio control cables very convenient.

Add to this, its rear access 9-pin serial port and parallel port, and this PC has all the connection types required by any radio software that I know of.

Before we leave the case, it should be noted that its metal-to-metal construction should do a good job minimizing radio interference. That's exactly what a radio friendly PC should do.

❖ Out of the Box

Setting up the RFPC is a "no-brainer."

1. Take RFPC out of box.
2. Attach your own keyboard and mouse.
3. Attach your monitor and speakers.
4. Attach the included AC cord.
5. Press the "on" button.

That's it! Turning on the RFPC yields the same familiar Windows XP Desktop. Getting to the Desktop screen seemed a bit, almost imperceptibly, slower.

❖ Atomic Web Power

Although the RFPC has a LAN connection on the rear panel, I installed a USB wireless Internet transceiver. It was purchased for less than \$10; looks like a USB memory stick, and came in a plain white box, not exactly high-end. With six USB ports available on the RFPC, I didn't mind dedicating one for wireless Internet use. Using the CD that came with the wireless device, it was installed on the Radio Friendly PC without a problem. Within minutes the RFPC was connected wirelessly to the Internet.

Both Firefox version 3 and the most recent version of Internet Explorer operated smoothly on the RFPC. Even when a number of tabs were opened, the RFPC didn't miss a beat. All screens came up at their normal speeds.

OK. So everything looks pretty good, so far. But how will the Radio Friendly PC handle real monitoring programs? Let's see.

❖ First Up: HRD

As our first test, let's try the ubiquitous Ham Radio Deluxe (HRD). HRD installed

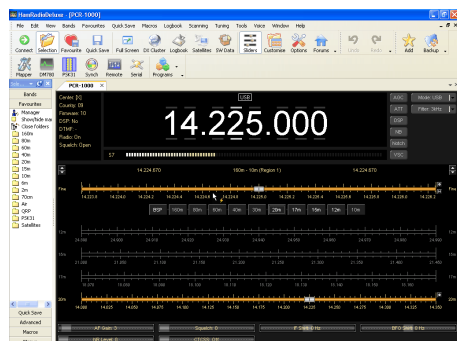


Figure 2 – The main screen of Ham Radio Deluxe controlling the PCR-1000 on the RFPC.

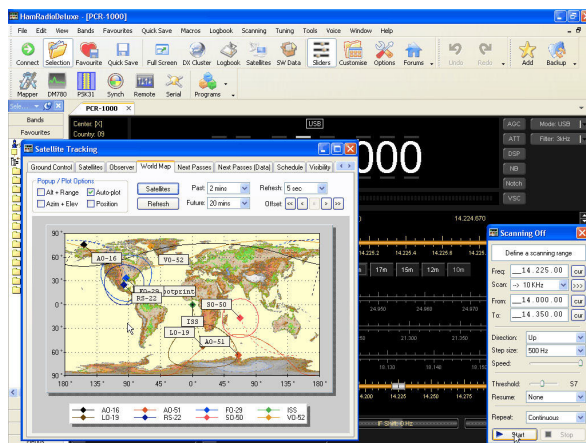


Figure 3 – The Radio Friendly PC showing its muscle – Three HRD windows opened simultaneously without a hiccup!

and ran perfectly without any problems. An ICOM PCR-1000 was connected via the 9-pin serial port. HRD found and started controlling it immediately. Figure 2 displays HRD's Main screen. All functions operated normally and smoothly without any hint of hesitation. Even the S-Meter display moved without delay as the signal strength varied.

Not being satisfied with having HRD operate in such a normal manner, I pushed the ATOM processor. Opening windows for the Main, Scanning, and Satellite Tracking windows simultaneously. As you can see in Figure 3, all operations still took place unimpeded. Even frequency scanning operated perfectly.

Well, if that didn't stop the RFPC's Atom, let's try another radio program whose main screen shows multiple displays, has receiver control and signal decoding capabilities. Now these will brutally load the Atom processor! Ha-Ha.

❖ In This Corner: RC 6

A few months ago we gave Bonito's RadioCom 6 a try and were impressed with its extensive capabilities. What better way to put the Radio Friendly PC to the test?

With the security dongle installed on RFPC's 9-pin serial port, RC 6 installed perfectly. Umm, still no major discernable performance difference between the Atom and my dual core Pentium.

To start, we simply opened the basic RC 6 functions and set it to control the Icom PCR-1000. Receiver control, audio DSP and audio signal displays functioned with no visible

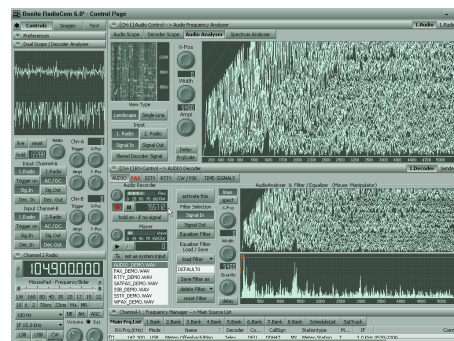


Figure 4 - Trying to stop the Radio Friendly PC with RadioCom 6 running full open.

problems or delays.

At this point I had spent hours creeping up on really dumping everything a radio application had on the RFPC. And yet, I had not been able to make it skip a beat, let alone crash. My patience was wearing thin and I was at my wits end. It was time to pull out all stops.

❖ Make It Crash!

First I turned on all RC 6's radio control functions. Then I activated its signal decoder module. Want more, Bub? Okay, turn on all six of RC 6's displays. Next, the audio recorder went on. I was hitting the keyboard like a concert pianist as I opened every RC 6 function I could think of. And still everything was functioning smoothly. See Figure 4.

In one final desperate effort I started Firefox alongside RC 6. For a few seconds, as Firefox opened, all RC 6 functions seemed to stop. I sensed my crashing/freezing goal was imminent!

But it was not to be. After about 6 seconds Firefox started performing normally and all RC 6 functions began where they left off. The Radio Friendly PC, and its Atom, had met my tests for radio monitoring applications and was still standing.

❖ The Bottom Line

Ham Radio Deluxe and RadioCom 6 represent a good typical cross-section of radio applications. The Radio Friendly PC worked perfectly with these two radio programs. The fact that the RFPC has USB ports, as well as a 9-pin serial port, makes it convenient to connect to a wide range of radio interfaces.

So where will the RFPC and its Atom fall over? Well, if you are a heavy gamer with lots of complex high-speed graphic requirements, or a flight simulator user, the Atom is probably not for you.

However, for our radio applications, which is where the RFPC is squarely aimed, it does a great job, in a small package, and at a reasonable price (\$399.95 + \$25 shipping; add 6% sales tax on Michigan orders). Check out their website for ordering information, <http://hcss.webs.com/> (or call 616-662-4495) and tell them you saw it in *MT's Computers & Radio*.

❖ Never Satisfied

As I was finishing this column, I thought of one more important radio application that any "radio friendly" PC should be capable of running... an SDR, software definable radio. So next month we'll see how the RFPC handles an SDR. We'll also finish last month's security topic by looking at a password manager program.

Till next month, Happy New Year to some of our readers and Happy Spring and Autumn to everyone else. Now that should just about cover the world.

What's NEW

Tell them you saw it in Monitoring Times

World Radio TV Handbook 2009

The publisher of the *World Radio TV Handbook*, the ultimate reference handbook for radio enthusiasts, has recently released the 2009 edition.

This year's publication begins with *Receiver and Antenna Reviews*, followed by a focus on *FM DXing* and *Digital Update*. Hobbyists who monitor stations from the subcontinent will enjoy Indian DXer, Jose Jacob, as he delves into a digest of *AIR Stations*.

George Jacobs revives his annual predictions for *The HF Broadcast Reception* and conditions during this year. Will Cycle 24 really increase in intensity this year?

National Radio and *International Radio* provide detailed listings, by-country, providing station name, personnel, postal addresses, broadcasting schedules and website information for medium wave, FM and shortwave and terrestrial television stations. *Clandestine* and other *Target Broadcast* cover stations targeting Afghanistan-Zimbabwe.

The Frequency List contains international mediumwave by-frequency listings, followed by *Shortwave Stations of the World*, *Broadcast in English*, *DRM International Broadcasters* and global television listings. An extensive reference section provides the listener with reference aids, transmitter sites and more.

World Radio TV Handbook consistently sets the radio hobby standards. It remains the best and most comprehensive radio reference book in the world, one that should be in every hobbyist's listening post or radio room. Quite simply, it is the ultimate guide – one not to be missed.

WRTH 2009 (BOK-03-09) is available from Grove Enterprises www.grove-ent.com for \$29.95 plus s/h. To place an order by phone 1-800-438-8155, postal address: 7540 Hwy. 64 West, Brasstown, NC 28902.

Review by Gayle Van Horn

2009 Shortwave Frequency Guide, 13th Edition

By Joerg Klingenfuss

The 13th Edition, *2009 Klingenfuss Shortwave Guide* has recently been released, and as with earlier editions, the 2009 release covers both worldwide broadcast and utility stations to comprise two reference aids in one book.

The 448 page, 13th Edition begins with a general overview of radio services, followed by monitoring utility stations, a how-to guide of features, and a by-frequency utility radio station arranged with call signs, station name, mode and details.

A frequency list of broadcast radio stations introduces the worldwide broadcast scene, DRM (Digital Radio Mondiale) and a start/end DRM schedule. Stations are listed by frequency (2310-21655 kHz), station name, country, start/end times, language, target areas and remarks.

DXers who would rather focus on a particular country will find the same frequency listing and easy to follow format in the by-country section, *Alphabetical List of Broadcast Radio Stations*.

Frequency information, as well as parallel frequencies, appear to be as accurate as possible considering seasonal frequency adjustments. As with other hobby publications, the *Shortwave Frequency Guide* uses a respected staff of leading radio contributors, providing the latest in information on the broadcast scene.

The *Klingenfuss Shortwave Guide* remains a favorite reference in my listening post. The book layout for quick information access is easy to use. Whether monitoring a utility or broadcast station, this basic, no frills method of radio reference remains an asset to every listener.

For ordering information on the *2008 Klingenfuss Shortwave Frequency Guide* book, refer to: www.klingenfuss.org or Universal Radio www.universal-radio.com (Book # #3082, \$ 39.95 + S/H. Phone: 1-800-431-3939; FAX 1 614 866-2339. Universal Radio, Inc., 6830 Americana Parkway, Reynoldsburg, OH 43068-4113 USA)

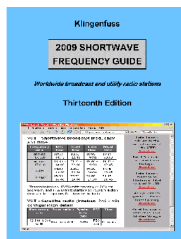
Review by Gayle Van Horn

2009/2010 Guide to Utility Radio Stations, 25th Edition

By Joerg Klingenfuss

The shortwave spectrum continues to be home to a myriad signals, both voice and data, communicating globally. Trying to identify these stations can be a challenge, but with an accurate, up-to-date directory, the task is much easier.

Joerg Klingenfuss' *Guide to Utility Radio Stations* has become the standard source on monitoring the first 30 MHz of the radio spectrum. His new 2009/2010 edition con-



tinues this tradition with nearly 600 pages of utility frequency listings along with identifications, modes, schedules, call signs, and services.

Information-packed chapters on digital data transmissions, along with hundreds of screen shots of decoded transmissions, assist the monitor in nailing down the sources of digital transmissions.

A handy fold-out of duplex maritime frequency allocations assists the listener in finding ship-to-shore SSB channels; tables of standard abbreviations, codes, and international radio regulations provide additional insight into monitoring.

Every serious shortwave listener should treat himself to this essential consummate reference.

This publication sells for \$59.95 plus shipping from Universal Radio (see contact info above) and other dealers.

Review by Bob Grove

2009 Super Frequency List on CD

By Joerg Klingenfuss

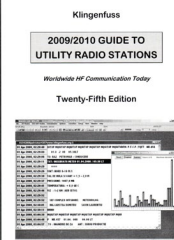
Now in its 15th annual edition, this CD is the quintessential standard of reference for shortwave listeners. It is a massive, accurate composite of clandestine, utility and broadcasting stations listed in frequency order, which the listener can browse and search with key words. The disk contains some 300 screen shots of decoded data transmissions as well.

This powerful, Windows PC (XP and Vista)-compatible database contains more than 40,000 broadcast and utilities frequency listings, including formerly-active stations in case they are reactivated. Listings include frequency, location, language, modes, identification, call signs, and schedule as appropriate.

If you want instant information on stations heard in the 3-30 MHz spectrum, this CD is for you!

\$35.95 plus postage from Grove Enterprises (740 Hwy 64 West, Brasstown, NC 28902; 800-438-8155; www.grove-ent.com); also available from other MT advertisers.

Review by Bob Grove



What's NEW

Tell them you saw it in Monitoring Times

RadioReference Scanner Database on CD

This new database is a massive compendium of scanner-related frequencies and associated information across the U.S. There are also selected listings from Canada, Mexico and other countries around the globe. The database is extremely user friendly, and is updated periodically so that the customer receives the latest version.



Self loading, the open screen reveals an interactive map of the U.S. to make the user's selections much easier. Select your state or simply click on a major metropolitan area from an accompanying list – the CD will download the information for your listening area.

Records are searchable by frequency, state, city/county, zip code, or trunking system. While the disk is not editable, it does contain Excel spread sheets which can be downloaded to your computer for massaging and updating.

The files are corroborated with official sources as possible, and are a combination

of official files and submittals by listeners through the interactive RadioReference web site.

Data are arranged by geography, and include state/county/local government, airports, federal government, military aircraft, law enforcement, prisons, transportation, port operations, EMS, medevac, utilities, railroads, and even major businesses and malls.

Convenient Internet links are provided for additional background information by subject.

For our review, I simply clicked on North Carolina, then selected my county, and up came a very professional and accurate data set: Frequency (including input/output repeater pairs), call sign, licensee, use, mode, base/mobile ID, and even squelch tones. I consider myself pretty savvy about local communications, but using the RadioReference database, I learned much more!

Next, selecting the new statewide trunking system for public safety agencies, I was greeted by a comprehensive list of talk groups with locations and frequencies as well as dec/hex numbers, alpha tags and other useful information to fully program my scanners.

This is unquestionably the most information-packed, comprehensive and authoritative scanner guide ever released, and it's at a

bargain price.

RadioReference Database on CD-ROM, \$29.95 from Grove Enterprises (see above) and other MT advertisers.

Review by Bob Grove

Books and equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Larry Van Horn, larryvanhorn@monitoringtimes.com

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<http://mt-milcom.blogspot.com/> - by Larry Van Horn

Larry's Monitoring Post

<http://monitor-post.blogspot.com/> - by Larry Van Horn

MT: SHORTWAVE

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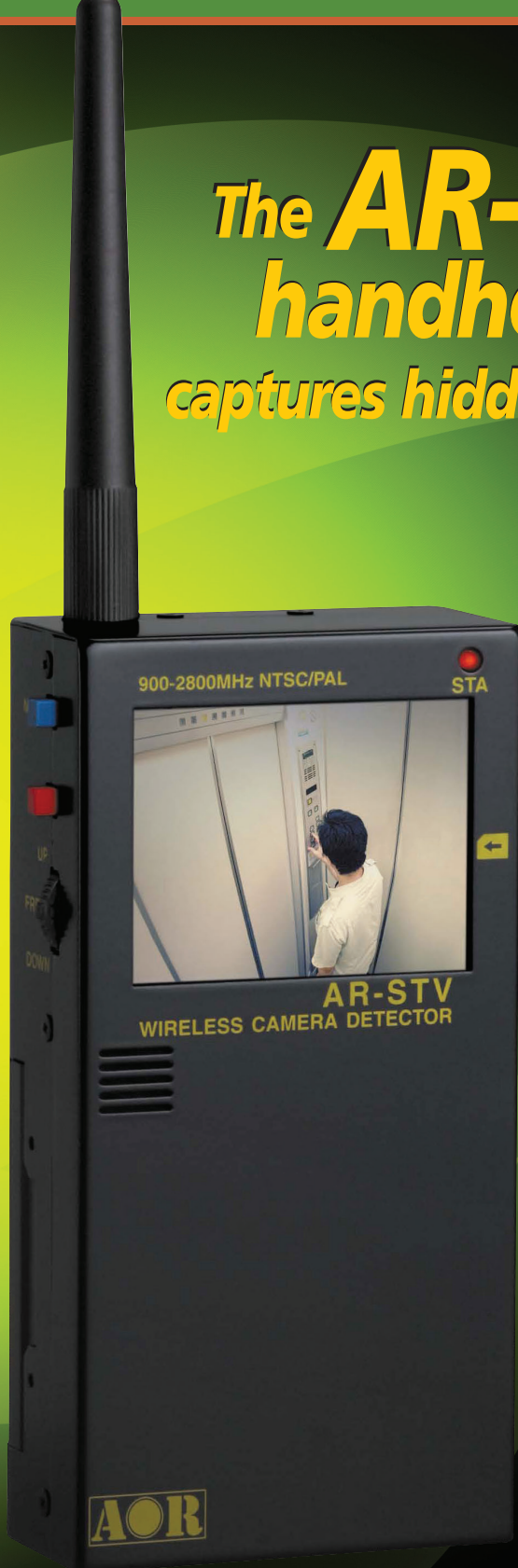
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- Can be set for continuous search between 900 ~ 2800 MHz
- Detects NTSC or PAL analog video signals in real-time
- Built-in clock allows captured images to be time-stamped
- USB connector makes it easy to download stored images into a computer
- Easy to operate
- Powered by four AA size batteries or external DC power
- NiMH batteries, belt clip and battery charger included
- Rubber duck antenna with SMA connector
- Optional 4 GB SD memory card can store nearly 2000 images

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